

# Century

## GEOPHYSICAL CORP.

5674

COMPANY : JACOBS ENG.  
WELL : 5674  
LOCATION/FIELD : ROCKY FLATS  
COUNTY : JEFFERSON  
STATE : COLORADO  
SECTION :

OTHER SERVICES:  
NATURAL  
GAMMA  
4 PI

TOWNSHIP : RANGE :

DATE : 08/24/94  
DEPTH DRILLER :  
LOG BOTTOM : 16.90  
LOG TOP : -3.60

PERMANENT DATUM :  
ELEV. PERM. DATUM:  
LOG MEASURED FROM: T.O.C.  
DRL MEASURED FROM: GL

ELEVATIONS  
KB :  
DF :  
GL :

CASING DRILLER : -  
CASING TYPE : PUC  
CASING THICKNESS: .185

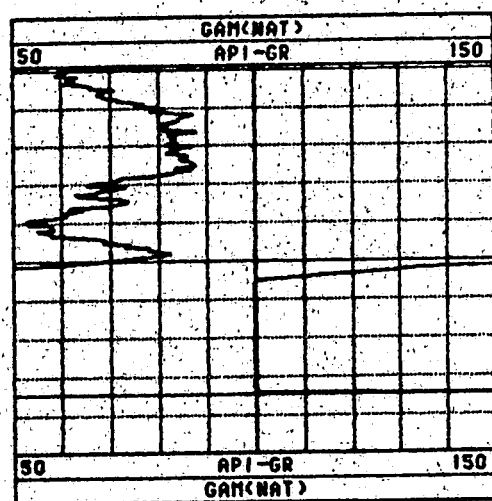
LOGGING UNIT : 9302  
FIELD OFFICE : LAS VEGAS  
RECORDED BY : R. FEDERWISCH

BIT SIZE : 8  
MAGNETIC DECL. : -  
MATRIX DENSITY : 1  
FLUID DENSITY : 1.0  
NEUTRON MATRIX : SANDSTONE  
REMARKS :

BOREHOLE FLUID : WATER  
RM : -  
RM TEMPERATURE : -  
MATRIX DELTA T : 1  
FLUID DELTA T : 1

FILE : ORIGINAL  
TYPE : 9068A  
LOG : 3  
PLOT : ROCKY @  
THRESH: 500000

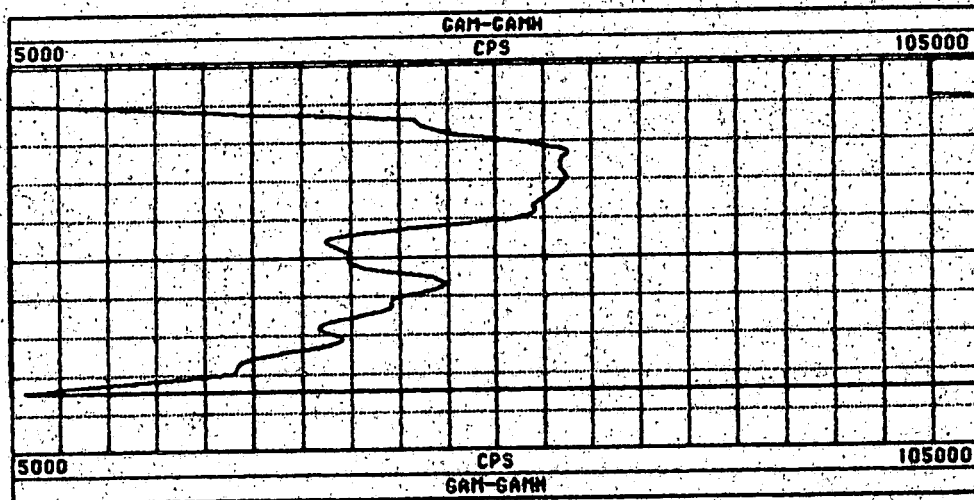
ALL SERVICES PROVIDED SUBJECT TO STANDARD TERMS AND CONDITIONS.



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TOOL CALIBRATION		TOOL = 9068A		SERIAL NUMBER = 642	
CAL-DATE	CAL-TIME	SRCE	SENSOR	RESPONSE	STANDARD
0 AUG23.94	08:03:25	0	GAM(NAT)	0.000 CPS	0.000 API-GR
1 AUG23.94	08:03:25	0	GAM(NAT)	197.000 CPS	200.000 API-GR



# Century GEOPHYSICAL CORP.

5574

COMPANY : JACOBS ENG.  
WELL : 5574  
LOCATION/FIELD : ROCKY FLATS  
COUNTY : JEFFERSON  
STATE : COLORADO  
SECTION :

OTHER SERVICES:  
NATURAL  
GAMMA  
4 PI

TOWNSHIP : RANGE :

DATE : 08/24/94  
DEPTH DRILLER :  
LOG BOTTOM : 32.30  
LOG TOP : -2.90

PERMANENT DATUM :  
ELEV. PERM. DATUM :  
LOG MEASURED FROM: I.O.C.  
DRL MEASURED FROM: GL

ELEVATIONS  
KB :  
DF :  
GL :

CASING DRILLER : -  
CASING TYPE : PVC  
CASING THICKNESS: .185

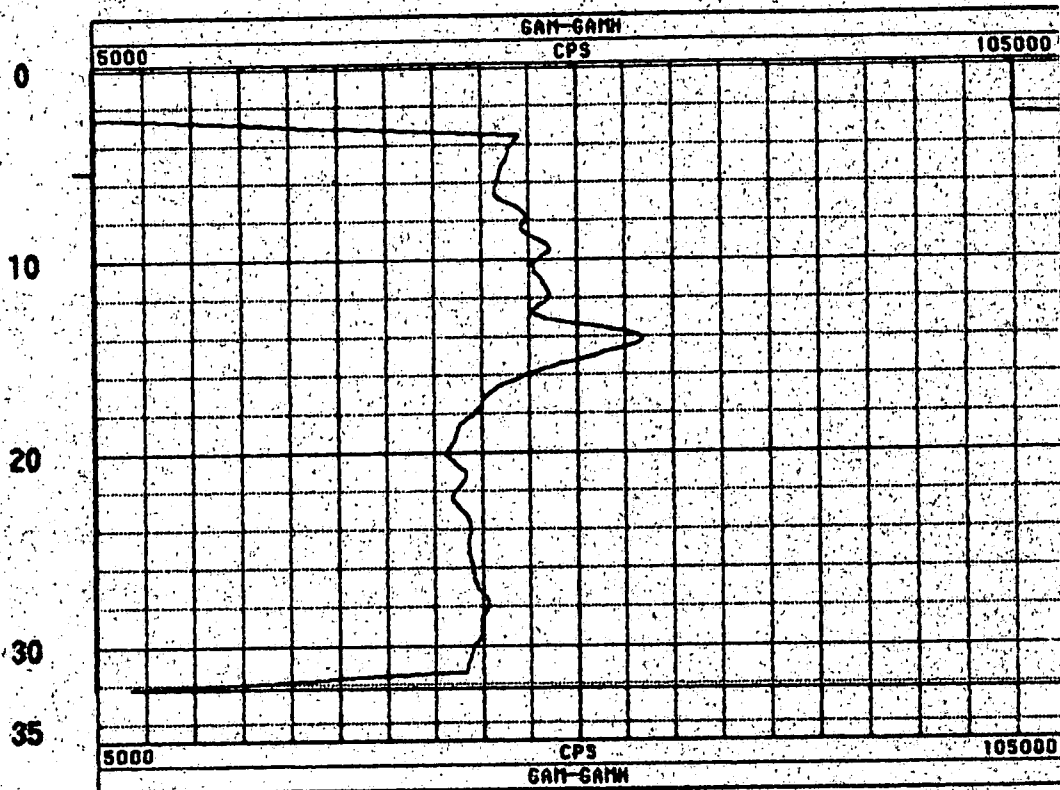
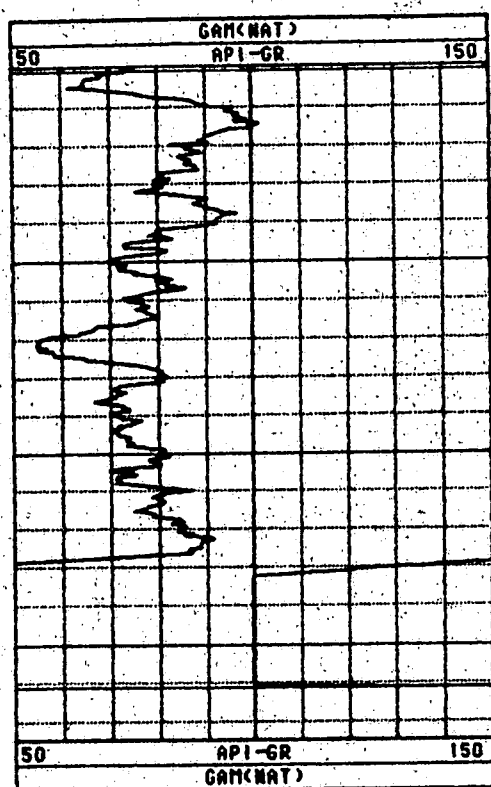
LOGGING UNIT : 9302  
FIELD OFFICE : LAS VEGAS  
RECORDED BY : R.FEDERWISCH

BIT SIZE : 8  
MAGNETIC DECL. : -  
MATRIX DENSITY : 1  
FLUID DENSITY : 1.0  
NEUTRON MATRIX : SANDSTONE  
REMARKS :

BOREHOLE FLUID : WATER  
RM : -  
RM TEMPERATURE : -  
MATRIX DELTA T : 1  
FLUID DELTA T : 1

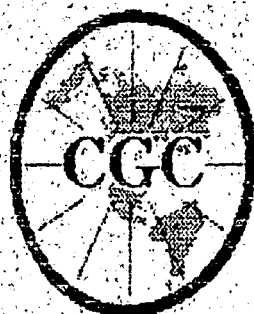
FILE : ORIGINAL  
TYPE : 9068A  
LOG : 2  
PLOT : ROCKY B  
THRESH: 500000

ALL SERVICES PROVIDED SUBJECT TO STANDARD TERMS AND CONDITIONS



TOOL CALIBRATION		TOOL = 9068A		SERIAL NUMBER = 642	
CAL-DATE	CAL-TIME	SRCE	SENSOR	RESPONSE	STANDARD
0	AUG23.94	08:03:25	0 GAM(NAT)	0.000 CPS	0.000 API-GR
1	AUG23.94	08:03:25	0 GAM(NAT)	197.000 CPS	200.000 API-GR





# Century

## GEOPHYSICAL CORP.

5474

COMPANY : JACOBS ENG.  
WELL : 5474  
LOCATION/FIELD : ROCKY FLATS  
COUNTY : JEFFERSON  
STATE : COLORADO  
SECTION :

OTHER SERVICES:  
NATURAL  
GAMMA  
4 Pi

TOWNSHIP :

RANGE :

DATE : 08/24/94  
DEPTH DRILLER :  
LOG BOTTOM : 19.30  
LOG TOP : -1.50

PERMANENT DATUM :  
ELEV. PERM. DATUM:  
LOG MEASURED FROM: T.O.C.  
DRI MEASURED FROM: GL

ELEVATIONS:  
KB :  
DF :  
GL :

CASING DRILLER : -  
CASING TYPE : PVC  
CASING THICKNESS: .185

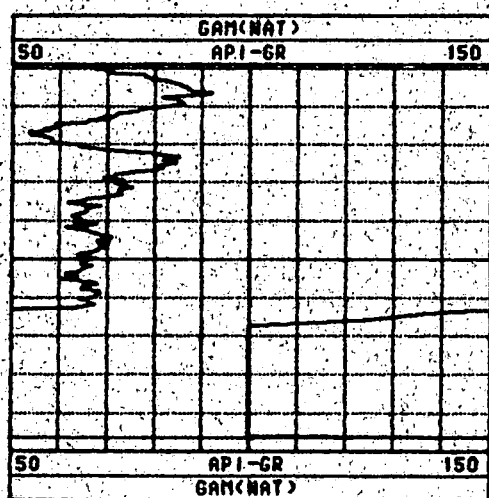
LOGGING UNIT : 9302  
FIELD OFFICE : LAS VEGAS  
RECORDED BY : R. FEDERWISCH

BIT SIZE : 8  
MAGNETIC DECL. : -  
MATRIX DENSITY : 1  
FLUID DENSITY : 1.0  
NEUTRON MATRIX : SANDSTONE  
REMARKS :

BOREHOLE FLUID : WATER  
RM : -  
RM TEMPERATURE : -  
MATRIX DELTA T : 1  
FLUID DELTA T : 1

FILE : ORIGINAL  
TYPE : 9068A  
LOG : 4  
PLOT : ROCKY 0  
THRESH: 500000

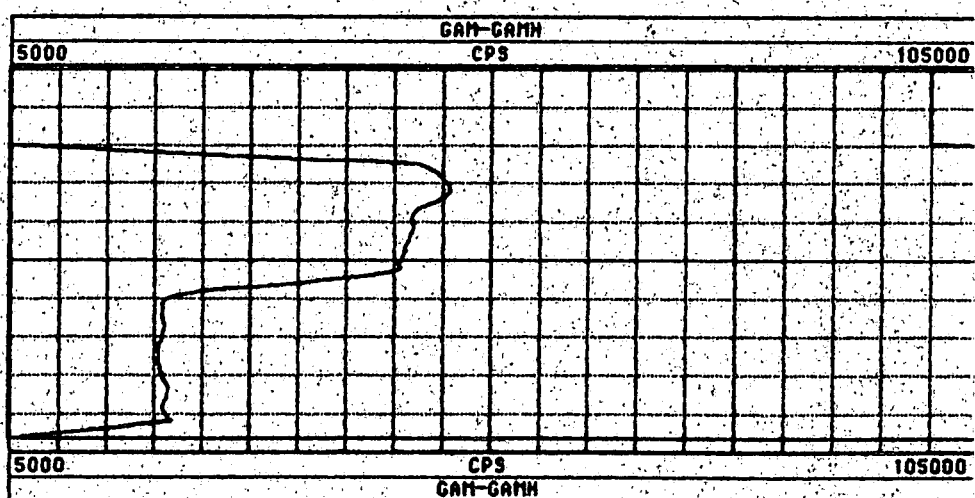
ALL SERVICES PROVIDED SUBJECT TO STANDARD TERMS AND CONDITIONS



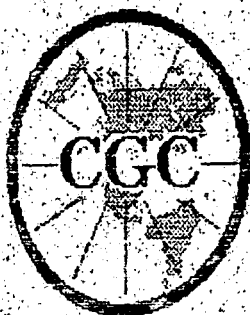
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TOOL CALIBRATION		TOOL = 9068A		SERIAL NUMBER = 642	
CAL-DATE	CAL-TIME	SRC	SENSOR	RESPONSE	STANDARD
0 AUG23.94	08:03:25	0	GAM(NAT)	0.000 CPS	0.000 API-GR
1 AUG23.94	08:03:25	0	GAM(NAT)	197.000 CPS	200.000 API-GR



*Century*  
**GEOPHYSICAL CORP.**

**5374**

COMPANY : JACOBS ENG.  
WELL : 5374  
LOCATION/FIELD : ROCKY FLATS  
COUNTY : JEFFERSON  
STATE : COLORADO  
SECTION :

OTHER SERVICES:  
NATURAL  
GAMMA  
4 Pi

TOWNSHIP :

RANGE :

DATE : 08/24/94  
DEPTH DRILLER :  
LOG BOTTOM : 19.10  
LOG TOP : -1.00

PERMANENT DATUM :  
ELEV. PERM. DATUM:  
LOG MEASURED FROM: T.O.C.  
DRL MEASURED FROM: GL

ELEVATIONS  
KB :  
DF :  
GL :

CASING DRILLER :  
CASING TYPE : PVC  
CASING THICKNESS: .185

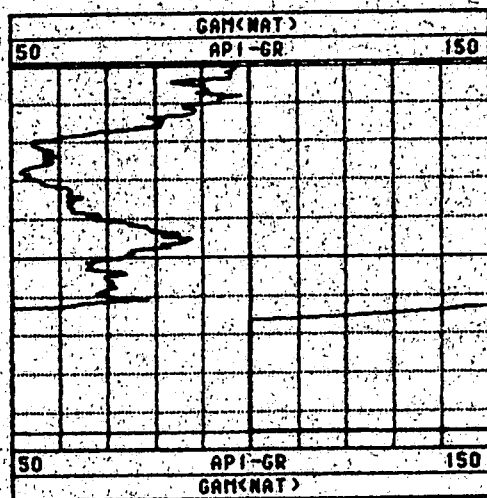
LOGGING UNIT : 9302  
FIELD OFFICE : LAS VEGAS  
RECORDED BY : R.FEDERWISCH

BIT SIZE : 8  
MAGNETIC DECL. :  
MATRIX DENSITY : 1  
FLUID DENSITY : 1.0  
NEUTRON MATRIX : SANDSTONE  
REMARKS :

BOREHOLE FLUID : WATER  
RM :  
RM TEMPERATURE :  
MATRIX DELTA T : 1  
FLUID DELTA T : 1

FILE : ORIGINAL  
TYPE : 9068A  
LOG : 5  
PLOT : ROCKY 0  
THRESH: 500000

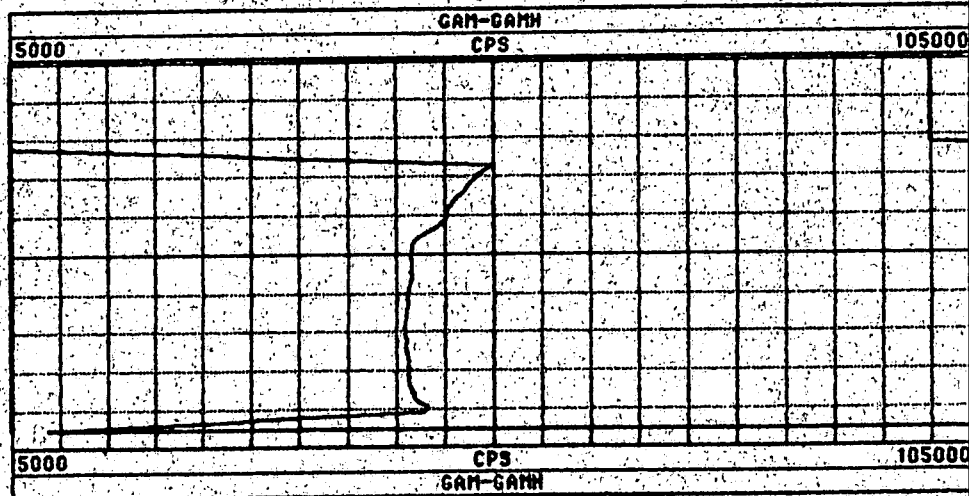
**ALL SERVICES PROVIDED SUBJECT TO STANDARD TERMS AND CONDITIONS**



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TOOL CALIBRATION		TOOL = 9066A		SERIAL NUMBER = 642	
CAL-DATE	CAL-TIME	SRCE	SENSOR	RESPONSE	STANDARD
0 AUG23.94	08:03:25	0	GAM(NAT)	0.000 CPS	0.000 API-GR
1 AUG23.94	08:03:25	0	GAM(NAT)	197.000 CPS	200.000 API-GR



*Century*  
GEOPHYSICAL CORP.

5274

COMPANY : JACOBS ENG.  
WELL : 5274  
LOCATION/FIELD : ROCKY FLATS  
COUNTY : JEFFERSON  
STATE : COLORADO  
SECTION :

OTHER SERVICES:

NATURAL

CANON

GPI

TOWNSHIP :

RANGE :

DATE : 08/24/94

PERMANENT DATUM :

ELEVATIONS

DEPTH DRILLER :

ELEV. PERM. DATUM :

KB :

LOG BOTTOM :

6.30

LOG MEASURED FROM: T.O.C.

DF :

LOG TOP :

-4.30

DEL MEASURED FROM: GL

GL :

CASING DRILLER :

LOGGING UNIT :

9302

CASING TYPE :

PVC

FIELD OFFICE :

LAS VEGAS

CASING THICKNESS :

.185

RECORDED BY :

R. FEDERWISCH

BIT SIZE :

8

BOREHOLE FLUID :

WATER

FILE : ORIGINAL

MAGNETIC DECL. :

RM

TYPE : 9065A

MATRIX DENSITY :

1

RM TEMPERATURE :

LOG : 2

FLUID DENSITY :

1.0

MATRIX DELTA T :

1

PLOT : ROCKY 2

NEUTRON MATRIX

SANDSTONE

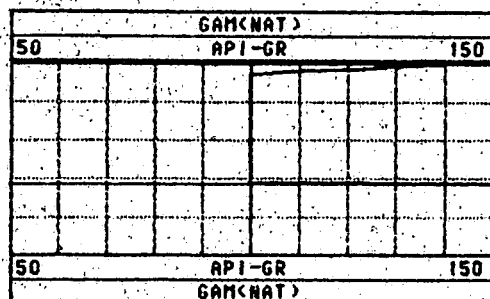
FLUID DELTA T :

1

THRESH: 500000

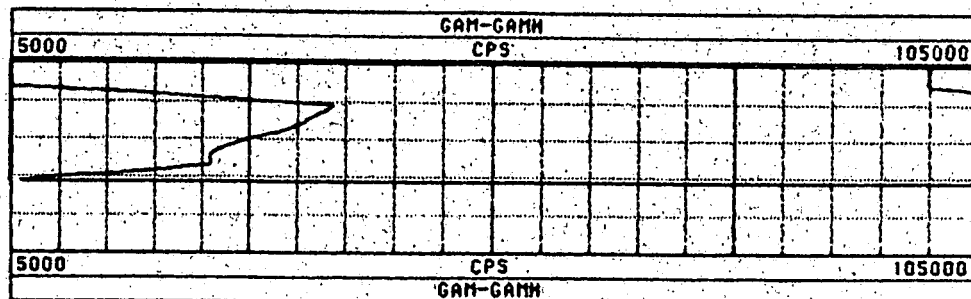
REMARKS :

ALL SERVICES PROVIDED SUBJECT TO STANDARD TERMS AND CONDITIONS

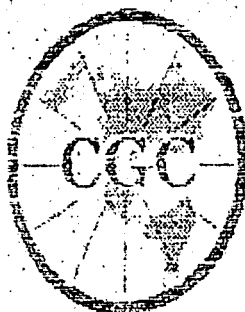


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TOOL CALIBRATION						
TOOL = 9068A			SERIAL NUMBER = 642			
CAL-DATE	CAL-TIME	SPEC	SENSOR	RESPONSE	STANDARD	
0 AUG23.94	08:03:25	0	GAM(NAT)	0.000 CPS	0.000	API-GR
1 AUG23.94	08:03:25	0	GAM(NAT)	197.000 CPS	200.000	API-GR



# Century

## GEOPHYSICAL CORP.

5174

COMPANY : JACOBS ENG.  
WELL : 5174  
LOCATION/FIELD : ROCKY FLATS  
COUNTY : JEFFERSON  
STATE : COLORADO  
SECTION :

OTHER SERVICES:  
NATURAL  
GAMMA  
4 PL

TOWNSHIP :

RANGE :

DATE : 08/24/94  
DEPTH DRILLER :  
LOG BOTTOM : 13.87  
LOG TOP : -2.98

PERMANENT DATUM :  
ELEV. PERM. DATUM :  
LOG MEASURED FROM: I.O.C.  
DRL MEASURED FROM: CL

ELEVATIONS

XD

DF

CL

CASING DRILLER : -  
CASING TYPE : PVC  
CASING THICKNESS : .185

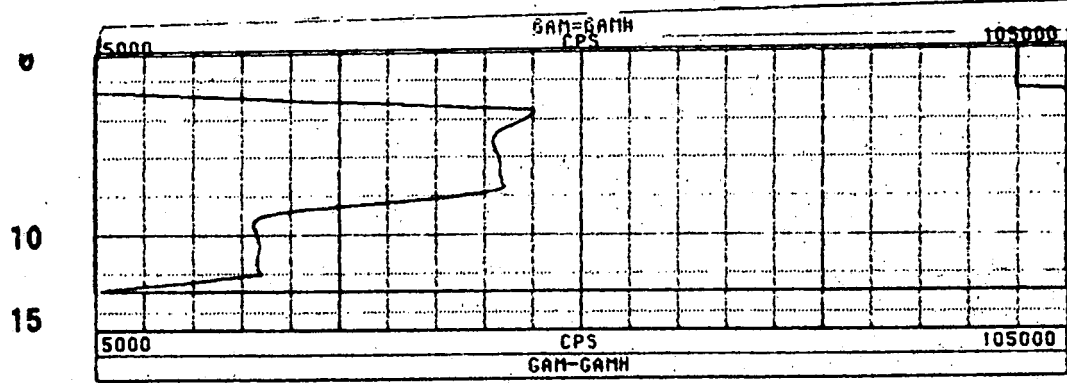
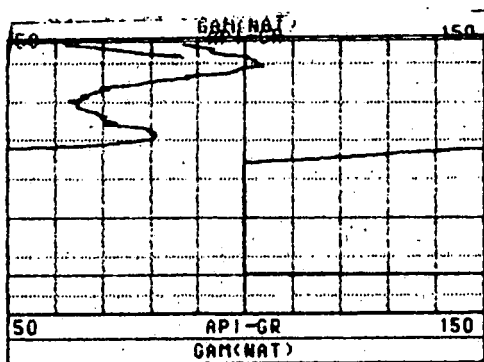
LOGGING UNIT : 9062  
FIELD OFFICE : LAS VEGAS  
RECORDED BY : R. J. EDWARDS

BIT SIZE : 8  
MAGNETIC DECL. : -  
MATRIX DENSITY : 1  
FLUID DENSITY : 1.0  
NEUTRON MATRIX : SANDSTONE  
REMARKS :

BOREHOLE FLUID : WATER  
RM : -  
RM TEMPERATURE : -  
MATRIX DELTA T : 1  
FLUID DELTA T : 1

FILE : ORIGINAL  
TYPE : 9068A  
LOG : 1  
PLOT : ROCKY 8  
THRESH: 500000

ALL SERVICES PROVIDED SUBJECT TO STANDARD TERMS AND CONDITIONS



TOOL CALIBRATION		TOOL = 9066A		SERIAL NUMBER = 64E	
<u>CAL-DATE</u>	<u>CAL-TIME</u>	<u>SRCE</u>	<u>SENSOR</u>	<u>RESPONSE</u>	<u>STANDARD</u>
0	AUG23.94	08:03:25	0	GAM(NAT)	5.000 CPS
1	AUG23.94	08:03:25	0	GAM(NAT)	197.000 CPS
					0.000 API-GR
					200.000 API-GR





*Century*  
GEOPHYSICAL CORP.

5574

COMPANY : JACOBS ENG.  
WELL : 5474  
LOCATION/FIELD : ROCKY FLATS  
COUNTY : JEFFERSON  
STATE : COLORADO  
SECTION :

OTHER SERVICES:  
NATURAL  
GAMMA  
4 P1

TOWNSHIP

RANGE

DATE : 08/24/94  
DEPTH DRILLER  
LOG BOTTOM : 13.15  
LOG TOP : -2.40

PERMANENT DATUM  
ELEV. PERM. DATUM:  
LOG MEASURED FROM: T.D.C.  
DRL MEASURED FROM: GL

ELEVATIONS  
RB  
DE  
GL

CASING DRILLER  
CASING TYPE : PUC  
CASING THICKNESS : .125

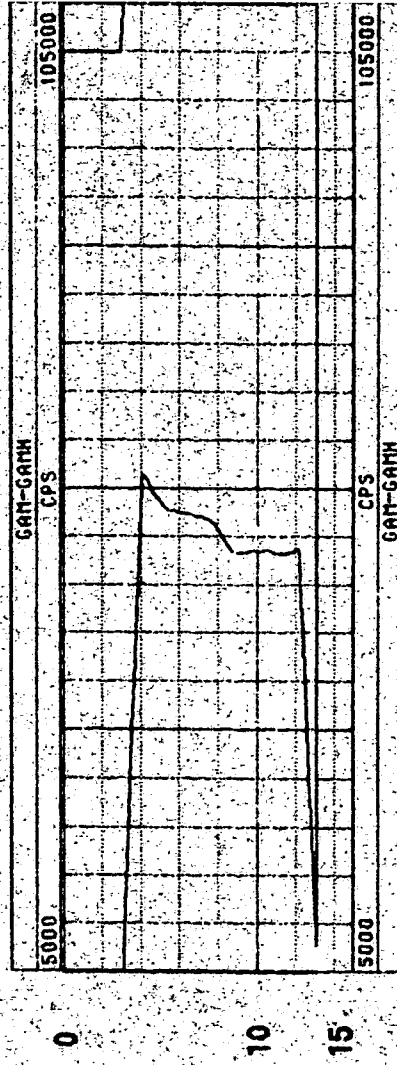
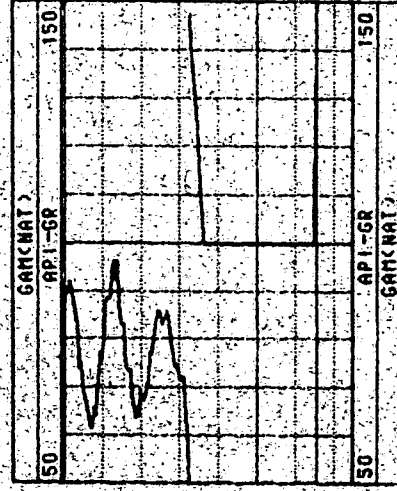
LOGGING UNIT : 4300  
FIELD OFFICE : LAS VEGAS  
RECORDED BY : R. FLEDERNICH

BIT SIZE : 8  
MAGNETIC DECL.  
MATRIX DENSITY : 1  
FLUID DENSITY : 1.0  
NEUTRON MATRIX : SANDSTONE  
REMARKS :

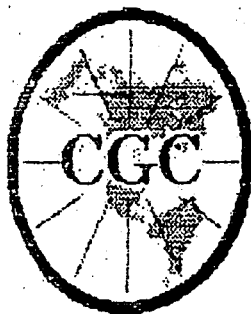
BOREHOLE FLUID : WATER  
RM  
RM TEMPERATURE  
MATRIX DELTA T : 1  
FLUID DELTA T : 1

FILE : ORIGINAL  
TYPE : 9800A  
LOG : 2  
PLOT : ROCKY 0  
THRESH: 500000

ALL SERVICES PROVIDED SUBJECT TO STANDARD TERMS AND CONDITIONS



TOOL CALIBRATION		TOOL = 9066P	SERIAL NUMBER = 542
CAL-DATE	CAL-TIME	SECE	SENGER
0 40523.94	08:03:25	0	0
0 40523.94	08:03:25	0	0
		RESPONSE	STANDARD
		10.000 CPS	10.000
		197.000 CPS	200.000
			APL-GR
			APL-GR



# Century

## GEOPHYSICAL CORP.

5774

COMPANY : JACOBS ENG.  
WELL : 5774  
LOCATION/FIELD : ROCKY FLATS  
COUNTY : JEFFERSON  
STATE : COLORADO  
SECTION :

OTHER SERVICES:  
NATURAL  
GAMMA  
4 Pi

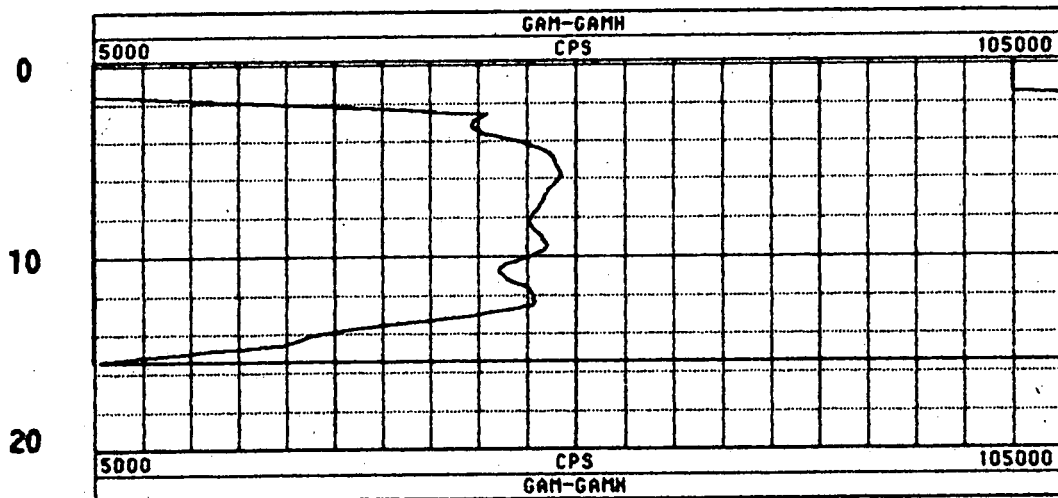
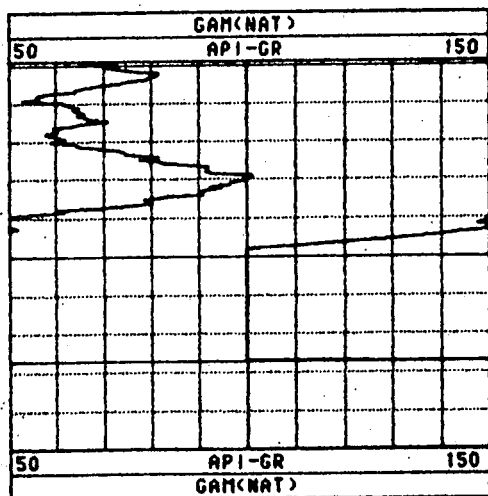
TOWNSHIP : RANGE :

DATE : 08/24/94 PERMANENT DATUM : ELEVATIONS  
DEPTH DRILLER : ELEV. PERM. DATUM: KB :  
LOG BOTTOM : 15.50 LOG MEASURED FROM: G.L. DF :  
LOG TOP : -3.90 DRL MEASURED FROM: GL GL :

CASING DRILLER : - LOGGING UNIT : 9302  
CASING TYPE : PVC FIELD OFFICE : LAS VEGAS  
CASING THICKNESS: .185 RECORDED BY : R.FEDERWISCH

BIT SIZE : 8 BOREHOLE FLUID : WATER FILE : ORIGINAL  
MAGNETIC DECL. : - RM : - TYPE : 9068A  
MATRIX DENSITY : 1 RM TEMPERATURE : - LOG : 6  
FLUID DENSITY : 1.0 MATRIX DELTA T : 1 PLOT : ROCKY 0  
NEUTRON MATRIX : SANDSTONE FLUID DELTA T : 1 THRESH: 500000  
REMARKS :  
casing broken at g.l.

ALL SERVICES PROVIDED SUBJECT TO STANDARD TERMS AND CONDITIONS



TOOL CALIBRATION

TOOL = 9066A

SERIAL NUMBER = 642

	CAL-DATE	CAL-TIME	SRCE	SENSOR	RESPONSE	STANDARD
0	AUG23.94	08:03:25	0	GAM(NAT)	0.000 CPS	0.000 API-GR
1	AUG23.94	08:03:25	0	GAM(NAT)	197.000 CPS	200.000 API-GR



**Century**  
**GEOPHYSICAL CORP.**

**5874**

COMPANY : JACOBS ENG.  
WELL : 5874  
LOCATION/FIELD : ROCKY FLATS  
COUNTY : JEFFERSON  
STATE : COLORADO  
SECTION :

OTHER SERVICES:  
NATURAL  
GAMMA  
4 Pi

TOWNSHIP :

RANGE :

DATE : 08/23/94  
DEPTH DRILLER :  
LOG BOTTOM : 19.40  
LOG TOP : -2.10

PERMANENT DATUM :  
ELEV. FERM. DATUM:  
LOG MEASURED FROM: T.O.C.  
DEL MEASURED FROM: GL

ELEVATIONS  
KB :  
DF :  
GL :

CASING DRILLER : -  
CASING TYPE : PVC  
CASING THICKNESS: .185

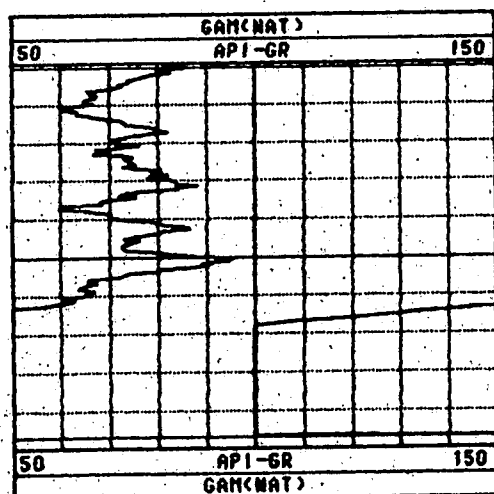
LOGGING UNIT : 9302  
FIELD OFFICE : LAS VEGAS  
RECORDED BY : R.FEDERWISCH

BIT SIZE : 8  
MAGNETIC DECL. : -  
MATRIX DENSITY : 1  
FLUID DENSITY : 1.0  
NEUTRON MATRIX : SANDSTONE  
REMARKS :

BOREHOLE FLUID : WATER  
RM : -  
RM TEMPERATURE : -  
MATRIX DELTA T : 1  
FLUID DELTA T : 1

FILE : ORIGINAL  
TYPE : 9068A  
LOG : 1  
PLOT : ROCKY 0  
THRESH: 500000

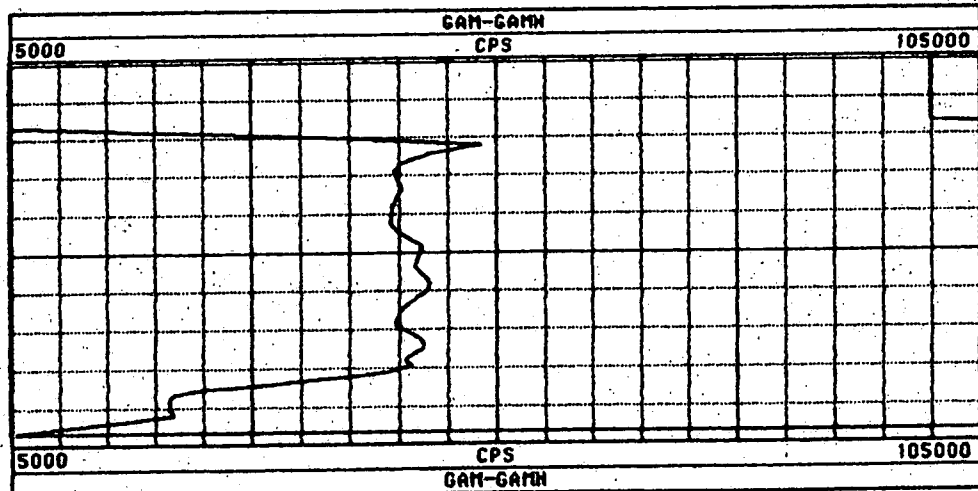
ALL SERVICES PROVIDED SUBJECT TO STANDARD TERMS AND CONDITIONS



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TOOL CALIBRATION						TOOL = 9068A		SERIAL NUMBER = 642	
	CAL-DATE	CAL-TIME	SRCE	SENSOR	RESPONSE	STANDARD			
0	AUG23.94	08:03:25	0	GAM(NAT)	0.000 CPS	0.000	API-GR		
1	AUG23.94	08:03:25	0	GAM(NAT)	197.000 CPS	200.000	API-GR		



**Century**  
**GEOPHYSICAL CORP.**

**5974**

COMPANY : JACOBS ENG.  
WELL : 5974  
LOCATION/FIELD : ROCKY FLATS  
COUNTY : JEFFERSON  
STATE : COLORADO  
SECTION :

OTHER SERVICES:  
NATURAL  
GAMMA  
4 Pi

TOWNSHIP

RANGE :

DATE : 08/23/94  
DEPTH DRILLER :  
LOG BOTTOM : 13.10  
LOG TOP : -2.10

PERMANENT DATUM :  
ELEV. PERM. DATUM :  
LOG MEASURED FROM: T.O.C.  
DRL MEASURED FROM: GL

ELEVATIONS  
KB :  
DF :  
GL :

CASING DRILLER : -  
CASING TYPE : PVC  
CASING THICKNESS : .185

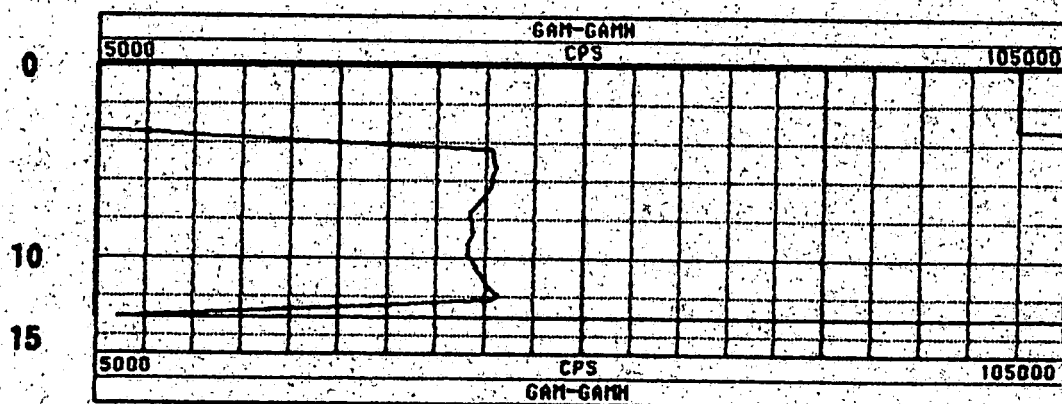
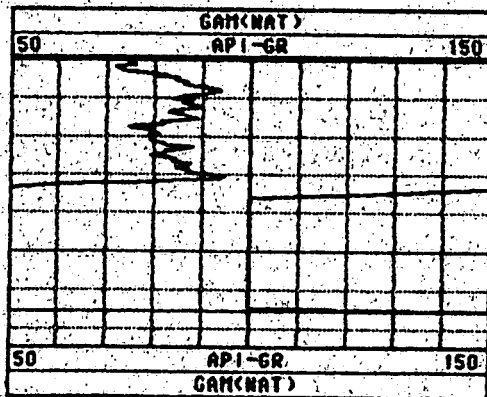
LOGGING UNIT : 9302  
FIELD OFFICE : LAS VEGAS  
RECORDED BY : R. FEDERWISCH

BIT SIZE : 8  
MAGNETIC DECL. : -  
MATRIX DENSITY : 1  
FLUID DENSITY : 1.0  
NEUTRON MATRIX : SANDSTONE  
REMARKS :

BOREHOLE FLUID : WATER  
RM : -  
RM TEMPERATURE : -  
MATRIX DELTA T : 1  
FLUID DELTA T : 1

FILE : ORIGINAL  
TYPE : 9068A  
LOG : 0  
PLOT : ROCKY 0  
THRESH: 500000

ALL SERVICES PROVIDED SUBJECT TO STANDARD TERMS AND CONDITIONS



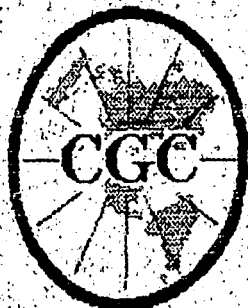
TOOL CALIBRATION

TOOL = 9068A

SERIAL NUMBER = 642

	CAL-DATE	CAL-TIME	SRCE	SENSOR	RESPONSE	STANDARD
0	AUG23.94	08:03:25	0	GAM(NAT)	0.000 CPS	0.000 API-GR
1	AUG23.94	08:03:25	0	GAM(NAT)	197.000 CPS	200.000 API-GR





# Century

## GEOPHYSICAL CORP.

6074

COMPANY : JACOBS ENG.  
WELL : 6074  
LOCATION/FIELD : ROCKY FLATS  
COUNTY : JEFFERSON  
STATE : COLORADO  
SECTION :

OTHER SERVICES:  
NATURAL  
GAMMA  
4 Pi

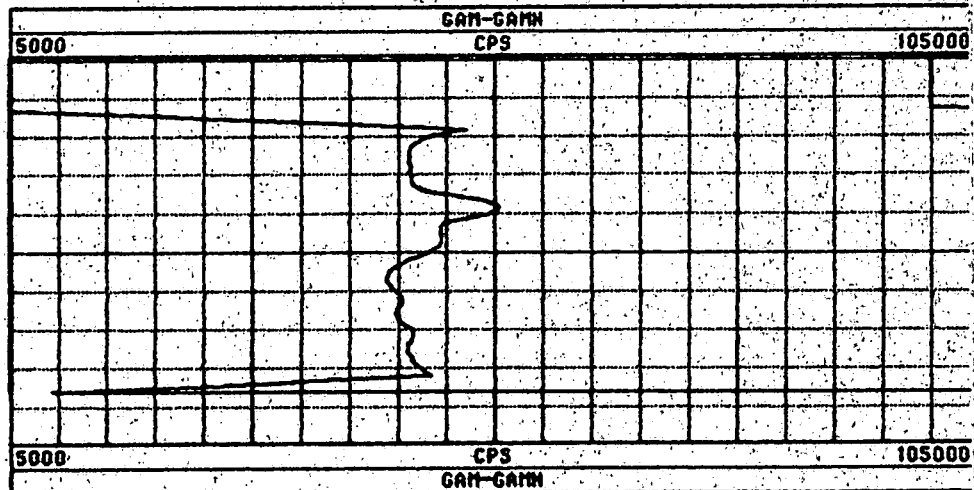
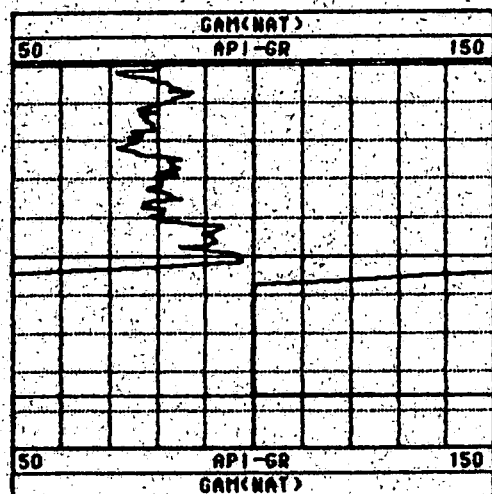
TOWNSHIP : RANGE :

DATE : 08/23/94 PERMANENT DATUM : ELEVATIONS  
DEPTH DRILLER : ELEV. PERM. DATUM : KB  
LOG BOTTOM : 17.30 LOG MEASURED FROM : T.O.C. : DF  
LOG TOP : -2.80 DRL MEASURED FROM : GL : GL

CASING DRILLER : - LOGGING UNIT : 9302  
CASING TYPE : PVC FIELD OFFICE : LAS VEGAS  
CASING THICKNESS : .185 RECORDED BY : R.FEDERWISCH

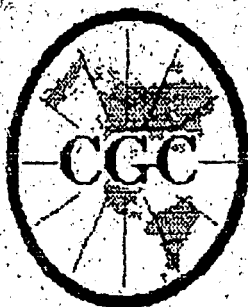
BIT SIZE : 8 BOREHOLE FLUID : WATER FILE : ORIGINAL  
MAGNETIC DECL. : - RM : - TYPE : 9068A  
MATRIX DENSITY : 1 RM TEMPERATURE : - LOG : 7  
FLUID DENSITY : 1.0 MATRIX DELTA T : 1 PLOT : ROCKY 0  
NEUTRON MATRIX : SANDSTONE FLUID DELTA T : 1 THRESH : 500000  
REMARKS :

ALL SERVICES PROVIDED SUBJECT TO STANDARD TERMS AND CONDITIONS



TOOL CALIBRATION TOOL = 9068A SERIAL NUMBER = 642

	CAL-DATE	CAL-TIME	SRCE	SENSOR	RESPONSE	STANDARD
0	AUG23.94	08:03:25	0	GAM(NAT)	0.000 CPS	0.000 API-GR
1	AUG23.94	08:03:25	0	GAM(NAT)	197.000 CPS	200.000 API-GR



**Century**  
**GEOPHYSICAL CORP.**

**6174**

COMPANY : JACOBS ENG.  
WELL : 6174  
LOCATION/FIELD : ROCKY FLATS  
COUNTY : JEFFERSON  
STATE : COLORADO  
SECTION :

OTHER SERVICES:  
NATURAL  
GAMMA  
4 Pi

TOWNSHIP :

RANGE :

DATE : 08/23/94  
DEPTH DRILLER :  
LOG BOTTOM : 17.40  
LOG TOP : -2.50

PERMANENT DATUM :  
ELEU. PERM. DATUM:  
LOG MEASURED FROM: T.O.C.  
DRL MEASURED FROM: GL

ELEVATIONS  
KB :  
DF :  
GL :

CASING DRILLER : -  
CASING TYPE : PVC  
CASING THICKNESS: .185

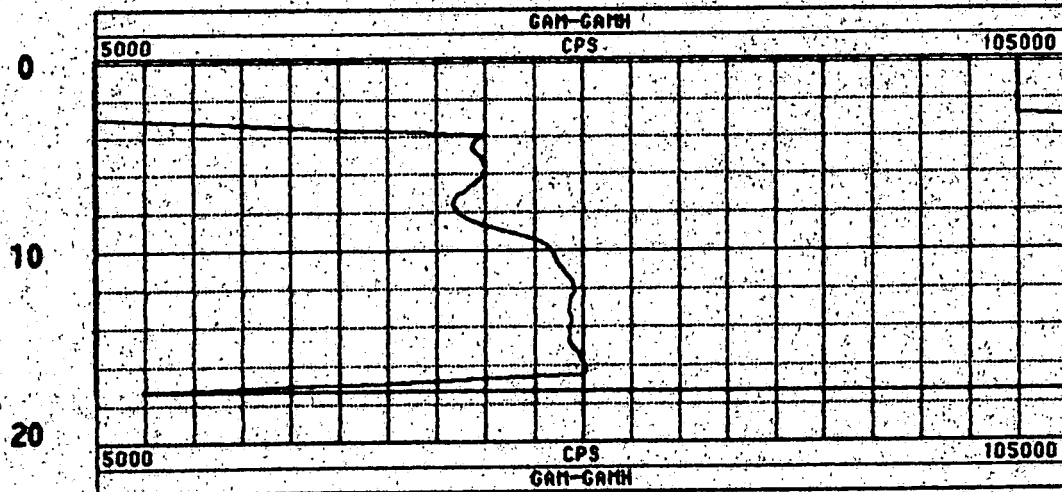
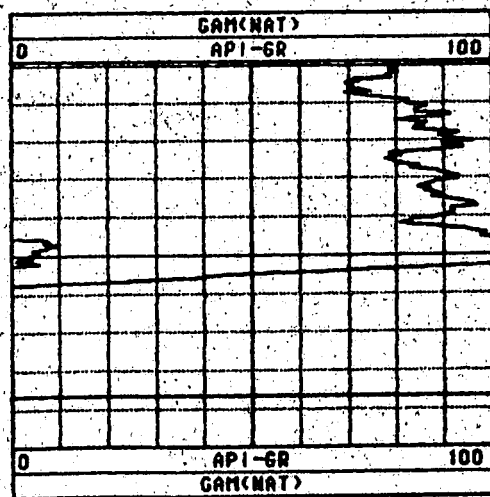
LOGGING UNIT : 9302  
FIELD OFFICE : LAS VEGAS  
RECORDED BY : R.FEDERMISCH

BIT SIZE : 8  
MAGNETIC DECL. : -  
MATRIX DENSITY : 1  
FLUID DENSITY : 1.0  
NEUTRON MATRIX : SANDSTONE  
REMARKS :

BOREHOLE FLUID : WATER  
RM : -  
RM TEMPERATURE : -  
MATRIX DELTA T : 1  
FLUID DELTA T : 1

FILE : ORIGINAL  
TYPE : 9060A  
LOG : 2  
PLOT : ROCKY B  
THRESH: 500000

ALL SERVICES PROVIDED SUBJECT TO STANDARD TERMS AND CONDITIONS



TOOL CALIBRATION

TOOL = 9068A

SERIAL NUMBER = 642

	CAL-DATE	CAL-TIME	SRCE	SENSOR	RESPONSE	STANDARD
0	AUG23,94	08:03:25	0	GAM(NAT)	0.000 CPS	0.000 API-GR
1	AUG23,94	08:03:25	0	GAM(NAT)	197.000 CPS	200.000 API-GR



**Century**  
**GEOPHYSICAL CORP.**

**6274**

COMPANY : JACOBS ENG.  
WELL : 6274  
LOCATION/FIELD : ROCKY FLATS  
COUNTY : JEFFERSON  
STATE : COLORADO  
SECTION :

OTHER SERVICES:  
NATURAL  
GAMMA  
4 Pi

TOWNSHIP : RANGE :

DATE : 08/23/94  
DEPTH DRILLER :  
LOG BOTTOM : 19.40  
LOG TOP : -1.70

PERMANENT DATUM : ELEVATIONS  
ELEV. PERM. DATUM: KB :  
LOG MEASURED FROM: T.O.C. DF :  
DRL MEASURED FROM: GL GL :

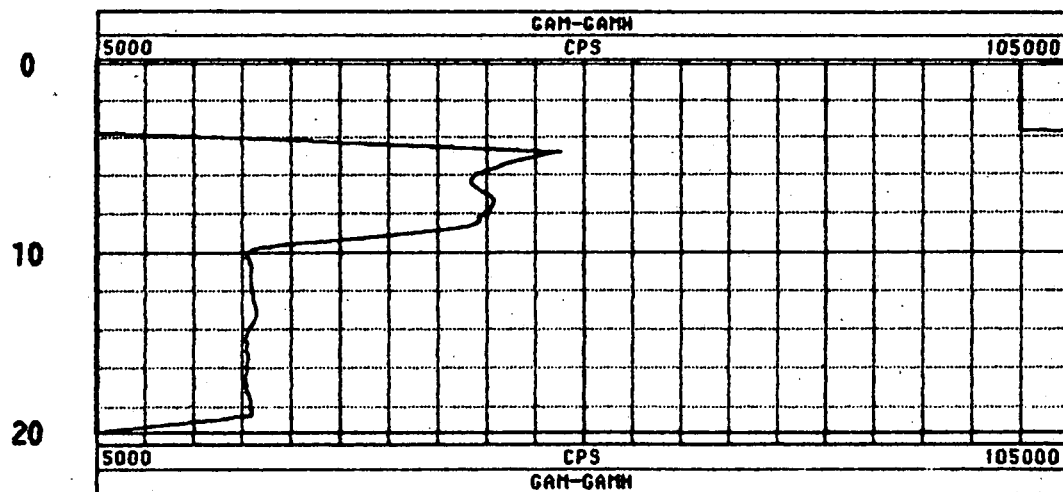
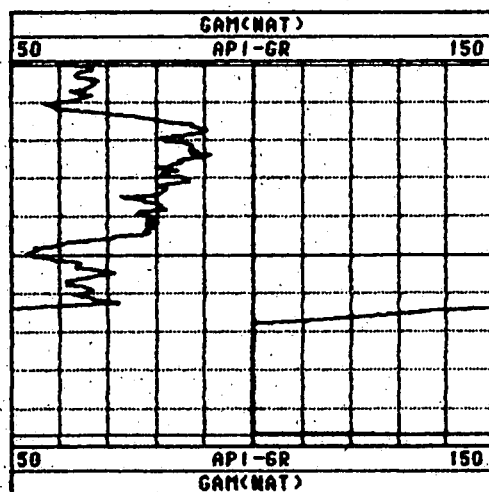
CASING DRILLER : -  
CASING TYPE : PVC  
CASING THICKNESS: .185

LOGGING UNIT : 9302  
FIELD OFFICE : LAS VEGAS  
RECORDED BY : R.FEDERWISCH

BIT SIZE : 8  
MAGNETIC DECL. : -  
MATRIX DENSITY : 1  
FLUID DENSITY : 1.0  
NEUTRON MATRIX : SANDSTONE  
REMARKS :

BOREHOLE FLUID : WATER  
RM : -  
RM TEMPERATURE : -  
MATRIX DELTA T : 1  
FLUID DELTA T : 1  
FILE : ORIGINAL  
TYPE : 9068A  
LOG : 9  
PLOT : ROCKY 0  
THRESH: 500000

ALL SERVICES PROVIDED SUBJECT TO STANDARD TERMS AND CONDITIONS



TOOL CALIBRATION TOOL = 9068A SERIAL NUMBER = 642

CAL-DATE	CAL-TIME	SRC	SENSOR	RESPONSE	STANDARD
0 AUG23.94	08:03:25	0	GAM(NAT)	0.000 CPS	0.000 API-GR
1 AUG23.94	08:03:25	0	GAM(NAT)	197.000 CPS	200.000 API-GR



**Century**  
**GEOPHYSICAL CORP.**

**6374**

COMPANY : JACOBS ENG.  
WELL : 6374  
LOCATION/FIELD : ROCKY FLATS  
COUNTY : JEFFERSON  
STATE : COLORADO  
SECTION :

OTHER SERVICES:  
NATURAL  
GAMMA  
4 Pi

TOWNSHIP :

RANGE :

DATE : 08/23/94  
DEPTH DRILLER :  
LOG BOTTOM : 17.70  
LOG TOP : -2.90

PERMANENT DATUM :  
ELEV. PERM. DATUM:  
LOG MEASURED FROM: T.O.C.  
DRL MEASURED FROM: GL

ELEVATIONS  
KB :  
DF :  
GL :

CASING DRILLER :  
CASING TYPE : PVC  
CASING THICKNESS: .185

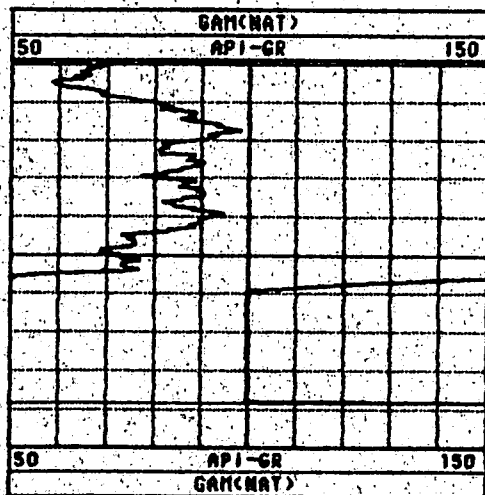
LOGGING UNIT : 9302  
FIELD OFFICE : LAS VEGAS  
RECORDED BY : R.FEDERWISCH

BIT SIZE : 8  
MAGNETIC DECL. :  
MATRIX DENSITY : 1  
FLUID DENSITY : 1.0  
NEUTRON MATRIX : SANDSTONE  
REMARKS :

BOREHOLE FLUID : WATER  
RM :  
RM TEMPERATURE :  
MATRIX DELTA T : 1  
FLUID DELTA T : 1

FILE : ORIGINAL  
TYPE : 9068A  
LOG : 8  
PLOT : ROCKY 0  
THRESH: 500000

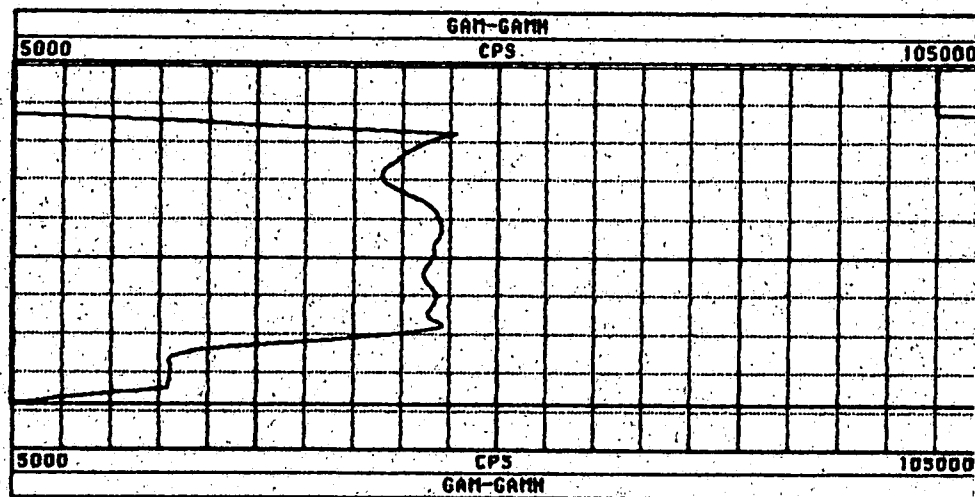
ALL SERVICES PROVIDED SUBJECT TO STANDARD TERMS AND CONDITIONS



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TOOL CALIBRATION		TOOL = 9068A		SERIAL NUMBER = 642	
CAL-DATE	CAL-TIME	SRCE	SENSOR	RESPONSE	STANDARD
0 AUG23.94	08:03:25	0	GAM(NAT)	0.000 CPS	0.000 API-GR
1 AUG23.94	08:03:25	0	GAM(NAT)	197.000 CPS	200.000 API-GR





**Century**  
**GEOPHYSICAL CORP.**

**6474**

COMPANY : JACOBS ENG.  
WELL : 6474  
LOCATION/FIELD : ROCKY FLATS  
COUNTY : JEFFERSON  
STATE : COLORADO  
SECTION :

OTHER SERVICES:  
NATURAL  
GAMMA  
4 Pi

TOWNSHIP : RANGE :

DATE : 08/23/94  
DEPTH DRILLER :  
LOG BOTTOM : 30.30  
LOG TOP : -2.90

PERMANENT DATUM : ELEVATIONS  
ELEV. PERM. DATUM: KB :  
LOG MEASURED FROM: T.O.C. DF :  
DRL MEASURED FROM: GL GL :

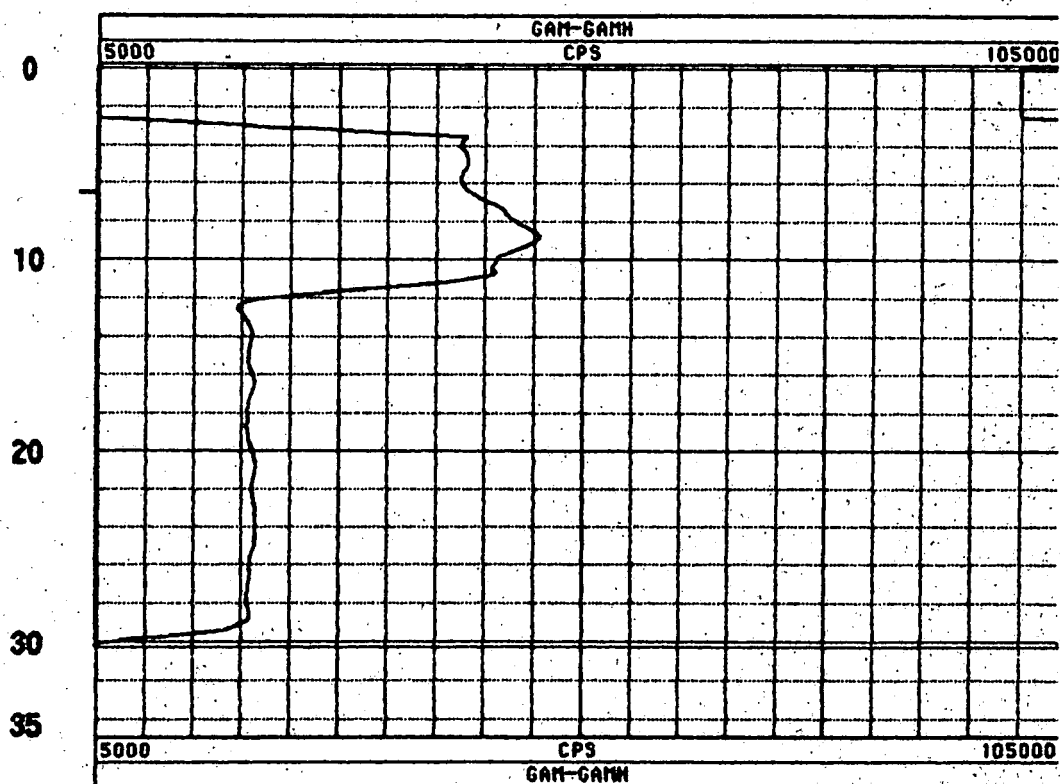
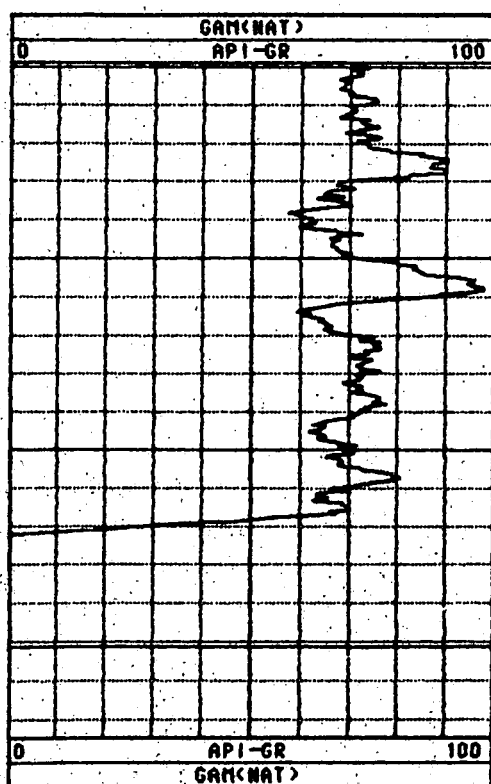
CASING DRILLER : -  
CASING TYPE : PVC  
CASING THICKNESS: .185

LOGGING UNIT : 9302  
FIELD OFFICE : LAS VEGAS  
RECORDED BY : R.FEDERWISCH

BIT SIZE : 8  
MAGNETIC DECL. : -  
MATRIX DENSITY : 1  
FLUID DENSITY : 1.0  
NEUTRON MATRIX : SANDSTONE  
REMARKS :

BOREHOLE FLUID : WATER  
RM : -  
RM TEMPERATURE : -  
MATRIX DELTA T : 1  
FLUID DELTA T : 1  
FILE : ORIGINAL  
TYPE : 9068A  
LOG : 0  
PLOT : ROCKY 0  
THRESH: 500000

ALL SERVICES PROVIDED SUBJECT TO STANDARD TERMS AND CONDITIONS

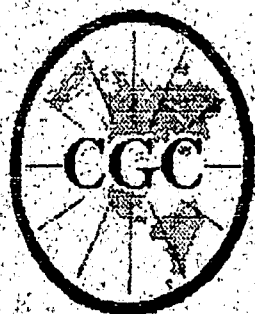


TOOL CALIBRATION

TOOL = 9068A

SERIAL NUMBER = 642

	CAL-DATE	CAL-TIME	SRCE	SENSOR	RESPONSE	STANDARD
0	AUG23.94	08:03:25	0	GAM(NAT)	0.000 CPS	0.000 API-GR
1	AUG23.94	08:03:25	0	GAM(NAT)	197.000 CPS	200.000 API-GR



**Century**  
**GEOPHYSICAL CORP.**

**6574**

COMPANY : JACOBS ENG.  
WELL : 6574  
LOCATION/FIELD : ROCKY FLATS  
COUNTY : JEFFERSON  
STATE : COLORADO  
SECTION :

OTHER SERVICES:  
NATURAL  
GAMMA  
4 Pi

TOWNSHIP :

RANGE :

DATE : 08/23/94  
DEPTH DRILLER :  
LOG BOTTOM : 28.90  
LOG TOP : -2.80

PERMANENT DATUM :  
ELEV. PERM. DATUM:  
LOG MEASURED FROM: T.O.C.  
DRL MEASURED FROM: GL

ELEVATIONS  
KB :  
DF :  
GL :

CASING DRILLER : -  
CASING TYPE : PVC  
CASING THICKNESS: .185

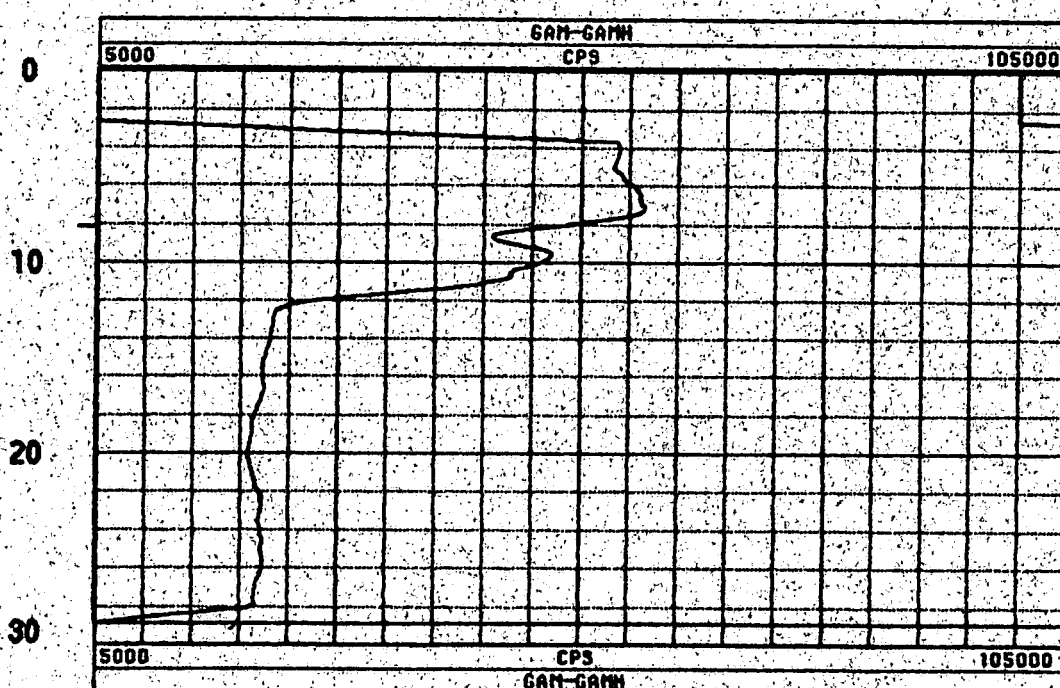
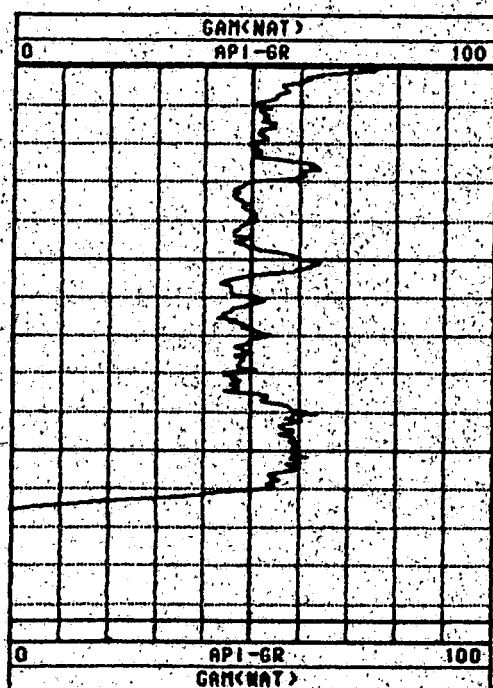
LOGGING UNIT : 9302  
FIELD OFFICE : LAS VEGAS  
RECORDED BY : R.FEDERWISCH

BIT SIZE : 8  
MAGNETIC DECL. : -  
MATRIX DENSITY : 1  
FLUID DENSITY : 1.0  
NEUTRON MATRIX : SANDSTONE  
REMARKS :

BOREHOLE FLUID : WATER  
RM : -  
RM TEMPERATURE : -  
MATRIX DELTA T : 1  
FLUID DELTA T : 1

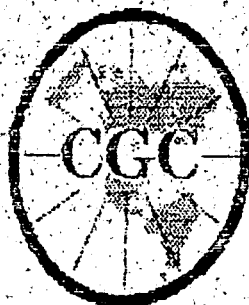
FILE : ORIGINAL  
TYPE : 9068A  
LOG : 6  
PLOT : ROCKY 0  
THRESH: 500000

ALL SERVICES PROVIDED SUBJECT TO STANDARD TERMS AND CONDITIONS



TOOL CALIBRATION TOOL = 9068A SERIAL NUMBER = 642

CAL-DATE	CAL-TIME	SRCE	SENSOR	RESPONSE	STANDARD
0 AUG23.94	08:03:25	0	GAM(NAT)	0.000 CPS	0.000 API-GR
1 AUG23.94	08:03:25	0	GAM(NAT)	197.000 CPS	200.000 API-GR



*Century*  
GEOPHYSICAL CORP.

6674

COMPANY : JACOBS ENG.  
WELL : 6674  
LOCATION/FIELD : ROCKY FLATS  
COUNTY : JEFFERSON  
STATE : COLORADO  
SECTION :

OTHER SERVICES:  
NATURAL  
GAMMA  
4 Pi

TOWNSHIP : RANGE :

DATE : 08/23/94  
DEPTH DRILLER :  
LOG BOTTOM : 17.70  
LOG TOP : -1.60

PERMANENT DATUM : ELEVATIONS  
ELEV. PERM. DATUM: KB  
LOG MEASURED FROM: T.O.C. DF  
DRI MEASURED FROM: GL GL

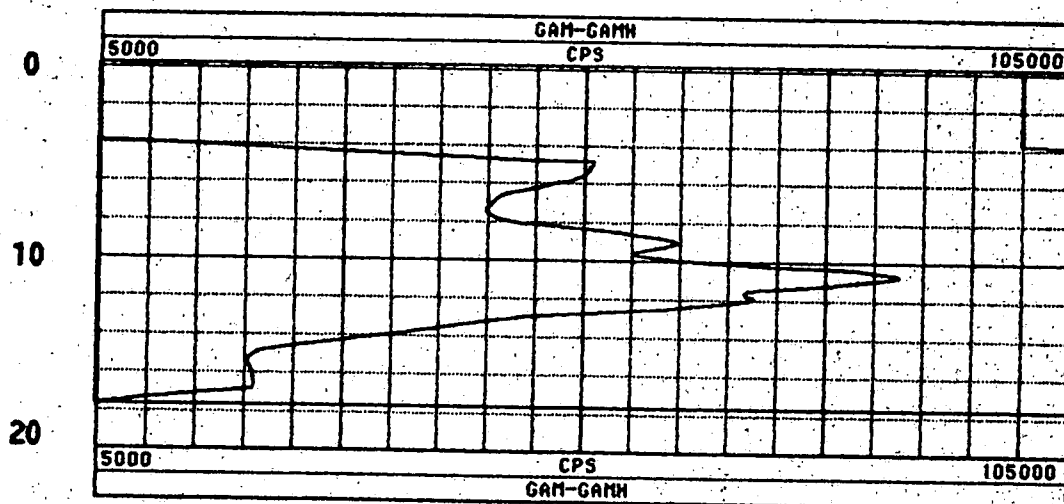
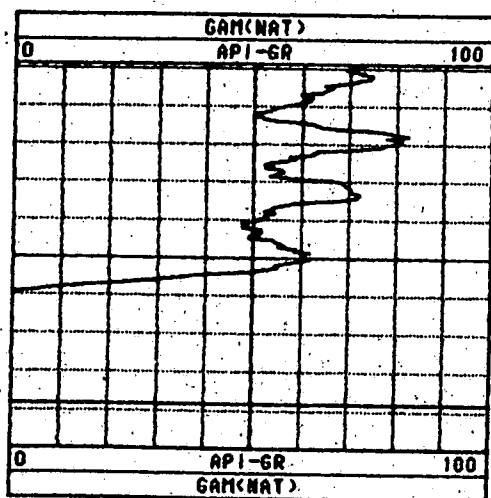
CASING DRILLER : -  
CASING TYPE : PVC  
CASING THICKNESS: .185

LOGGING UNIT : 9302  
FIELD OFFICE : LAS VEGAS  
RECORDED BY : R.FEDERMISCH

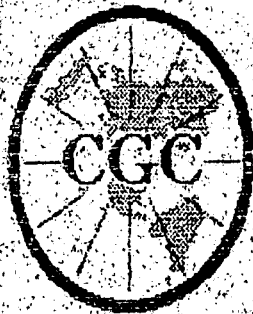
BIT SIZE : 8  
MAGNETIC DECL. : -  
MATRIX DENSITY : 1  
FLUID DENSITY : 1.0  
NEUTRON MATRIX : SANDSTONE  
REMARKS :

BOREHOLE FLUID : WATER FILE : ORIGINAL  
RM : - TYPE : 9068A  
RM TEMPERATURE : - LOG : 4  
MATRIX DELTA T : 1 PLOT : ROCKY 0  
FLUID DELTA T : 1 THRESH: 500000

ALL SERVICES PROVIDED SUBJECT TO STANDARD TERMS AND CONDITIONS



TOOL CALIBRATION		TOOL = 9068A		SERIAL NUMBER = 642	
CAL-DATE	CAL-TIME	SRCE	SENSOR	RESPONSE	STANDARD
0 AUG23.94	08:03:25	0	GAM(NAT)	0.000 CPS	0.000 API-GR
1 AUG23.94	08:03:25	0	GAM(NAT)	197.000 CPS	200.000 API-GR



# Century

## GEOPHYSICAL CORP.

6774

COMPANY : JACOBS ENG.  
WELL : 6774  
LOCATION/FIELD : ROCKY FLATS  
COUNTY : JEFFERSON  
STATE : COLORADO  
SECTION :

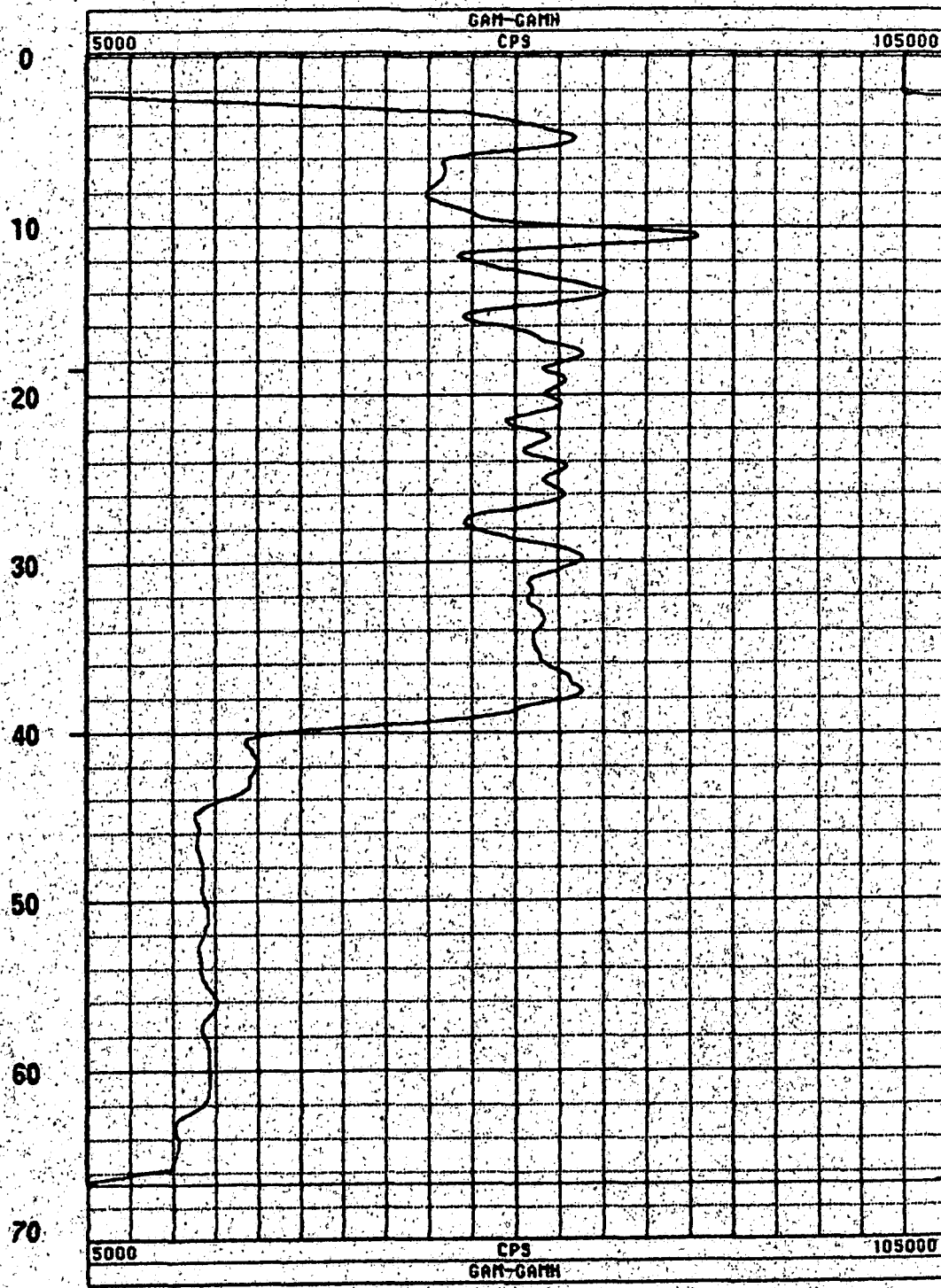
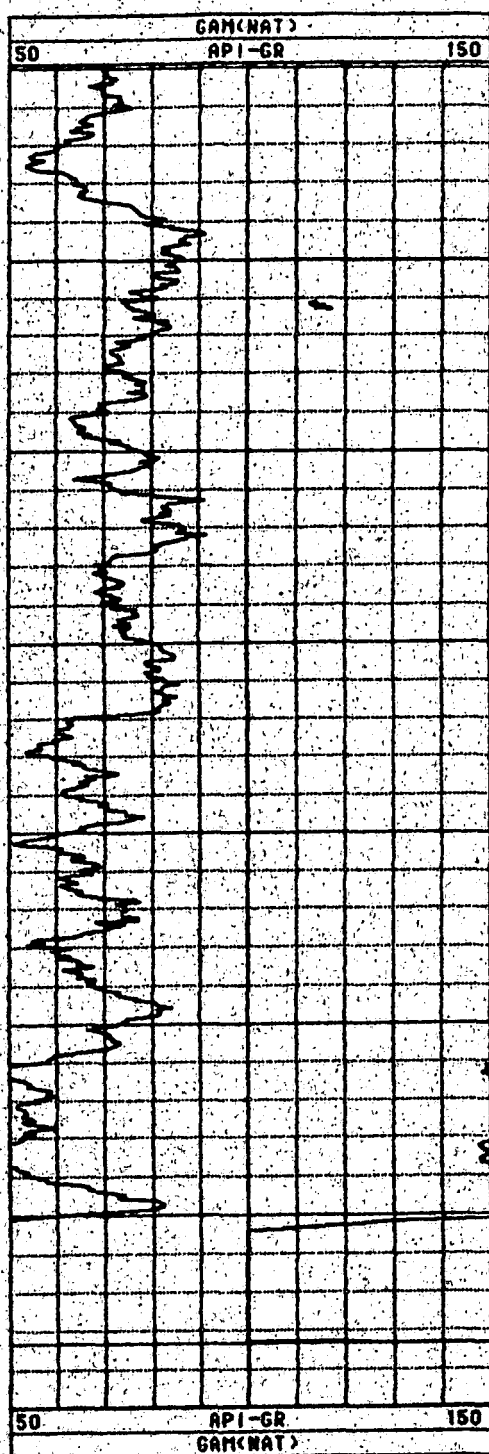
OTHER SERVICES :  
NATURAL  
GAMMA  
4 PI

TOWNSHIP : RANGE :  
DATE : 08/24/94 PERMANENT DATUM : ELEVATIONS  
DEPTH DRILLER : ELEV. PERM. DATUM : KB  
LOG BOTTOM : 66.78 LOG MEASURED FROM: T.O.C. DF  
LOG TOP : -3.28 DRL MEASURED FROM: GL GL

CASING DRILLER : - LOGGING UNIT : 9302  
CASING TYPE : PVC FIELD OFFICE : LAS VEGAS  
CASING THICKNESS: .185 RECORDED BY : R.FEDERWISCH

BIT SIZE : 8 BOREHOLE FLUID : WATER FILE : ORIGINAL  
MAGNETIC DECL. : - RM : - TYPE : 9068A  
MATRIX DENSITY : 1 RM TEMPERATURE : - LOG : 7  
FLUID DENSITY : 1.0 MATRIX DELTA T : 1 PLOT : ROCKY @  
NEUTRON MATRIX : SANDSTONE FLUID DELTA T : 1 THRESH: 500000  
REMARKS :

ALL SERVICES PROVIDED SUBJECT TO STANDARD TERMS AND CONDITIONS



TOOL CALIBRATION

TOOL = 9068A

SERIAL NUMBER = 642

CAL-DATE	CAL-TIME	SRCE	SENSOR	RESPONSE	STANDARD
0 AUG23.94	08:03:25	0	GAM(NAT)	0.000 CPS	0.000 API-GR
1 AUG23.94	08:03:25	0	GAM(NAT)	197.000 CPS	200.000 API-GR





**Century**  
**GEOPHYSICAL CORP.**

**5887**

COMPANY : JACOBS ENG.  
WELL : 5887  
LOCATION/FIELD : ROCKY FLATS  
COUNTY : JEFFERSON  
STATE : COLORADO  
SECTION :

OTHER SERVICES:  
NATURAL  
GAMMA  
CPI

TOWNSHIP : RANGE :

DATE : 08/23/94  
DEPTH DRILLER :  
LOG BOTTOM : 24.40  
LOG TOP : -2.10

PERMANENT DATUM :  
ELEV. PERM. DATUM:  
LOG MEASURED FROM: T.D.C.  
DRL MEASURED FROM: GL

ELEVATIONS  
KH :  
DT :  
GL :

CASING DRILLER : -  
CASING TYPE : PVC  
CASING THICKNESS: .185

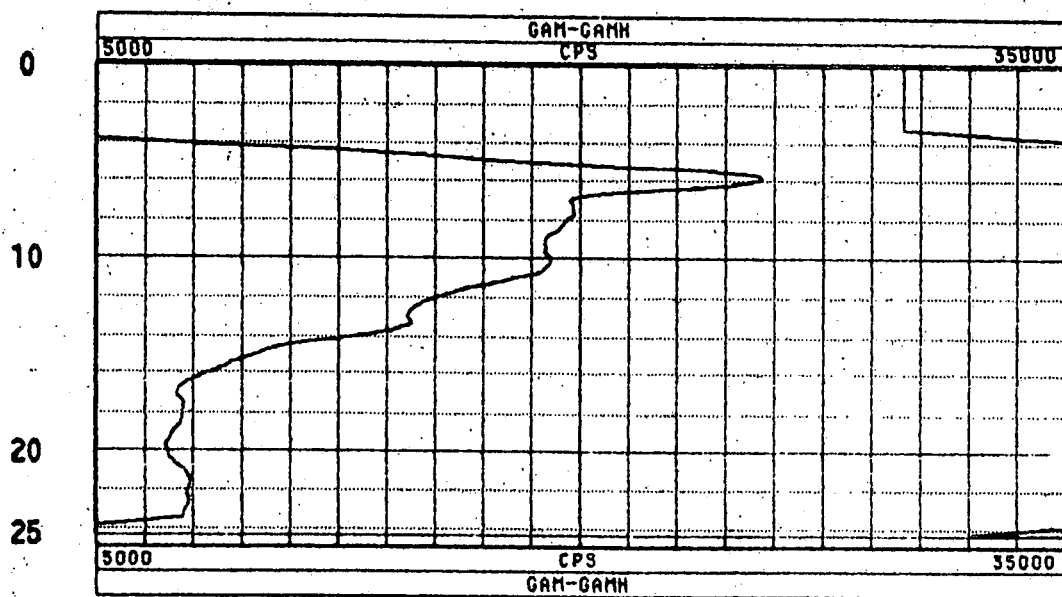
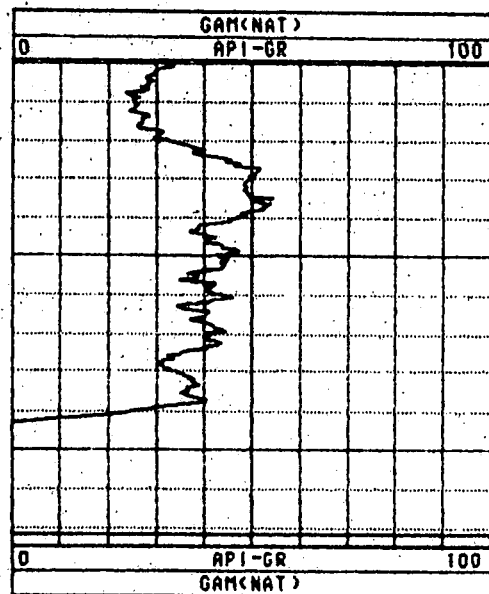
LOGGING UNIT : 9302  
FIELD OFFICE : LAS VEGAS  
RECORDED BY : R.FEDERWISCH

BIT SIZE : 8  
MAGNETIC DECL. : -  
MATRIX DENSITY : 1  
FLUID DENSITY : 1.0  
NEUTRON MATRIX : SANDSTONE  
REMARKS :

BOREHOLE FLUID : WATER  
RM : -  
RM TEMPERATURE : -  
MATRIX DELTA T : 1  
FLUID DELTA T : 1

FILE : ORIGINAL  
TYPE : 9068A  
LOG : 3  
PLOT : ROCKY 0  
THRESH: 500000

ALL SERVICES PROVIDED SUBJECT TO STANDARD TERMS AND CONDITIONS



TOOL CALIBRATION

TOOL = 9068A

SERIAL NUMBER = 642

CAL-DATE

CAL-TIME

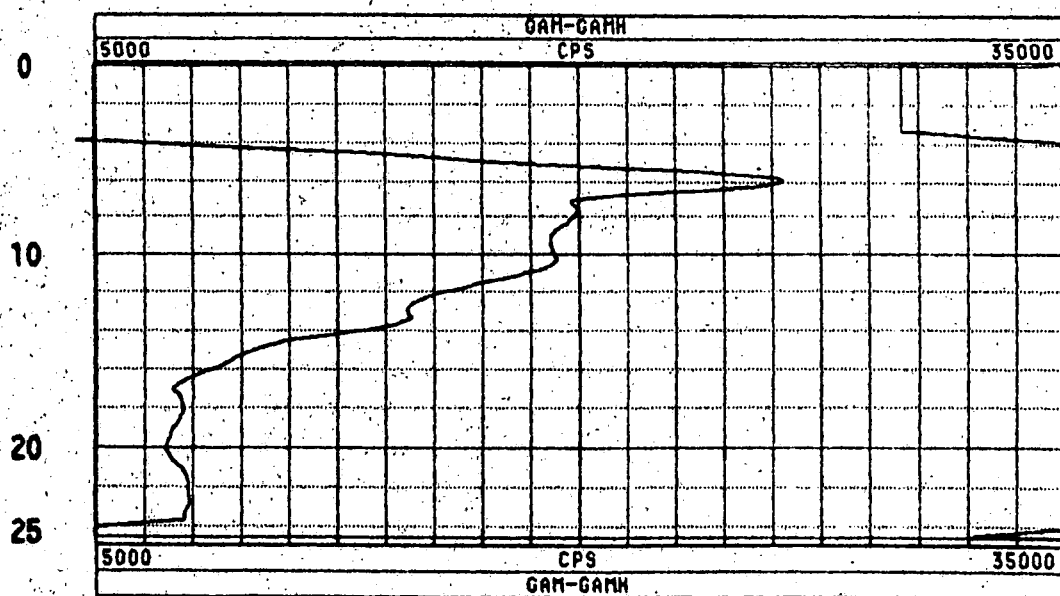
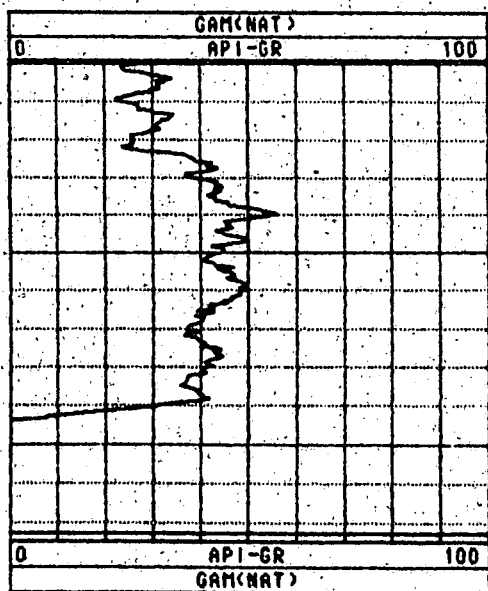
SRCE

SENSOR

RESPONSE

STANDARD

0	AUG23.94	08:03:25	0	GAM(NAT)	0.000 CPS	0.000	API-GR
1	AUG23.94	08:03:25	0	GAM(NAT)	197.000 CPS	200.000	API-GR

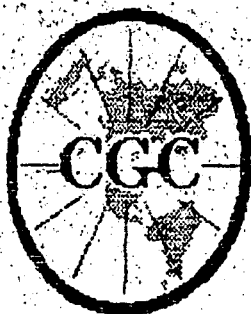


TOOL CALIBRATION

TOOL = 9068A

SERIAL NUMBER = 642

	CAL-DATE	CAL-TIME	SRCE	SENSOR	RESPONSE	STANDARD
0	AUG23.94	08:03:25	0	GAM(NAT)	0.000 CPS	0.000 API-GR
1	AUG23.94	08:03:25	0	GAM(NAT)	197.000 CPS	200.000 API-GR



# Century

## GEOPHYSICAL CORP.

7287

COMPANY : JACOBS ENG.  
WELL : 7287  
LOCATION/FIELD : ROCKY FLATS  
COUNTY : JEFFERSON  
STATE : COLORADO  
SECTION :

OTHER SERVICES:  
NATURAL  
GAMMA  
4 Pi

TOWNSHIP :

RANGE :

DATE : 08/23/94  
DEPTH DRILLER :  
LOG BOTTOM : 10.00  
LOG TOP : -2.00

PERMANENT DATUM :  
ELEV. PERM. DATUM:  
LOG MEASURED FROM: T.O.C.  
DRL MEASURED FROM: GL

ELEVATIONS

KB :  
DF :  
GL :

CASING DRILLER : -  
CASING TYPE : PUC  
CASING THICKNESS: .185

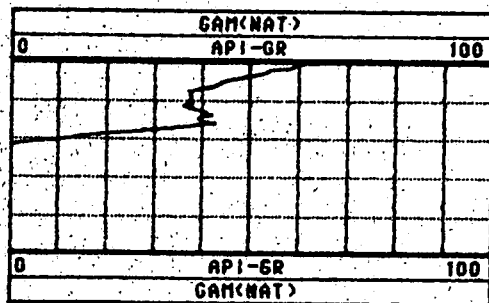
LOGGING UNIT : 9302  
FIELD OFFICE : LAS VEGAS  
RECORDED BY : R.FEDERWISCH

BIT SIZE : 8  
MAGNETIC DECL. : -  
MATRIX DENSITY : 1  
FLUID DENSITY : 1.0  
NEUTRON MATRIX : SANDSTONE  
REMARKS :

BOREHOLE FLUID : WATER  
RM : -  
RM TEMPERATURE : -  
MATRIX DELTA T : 1  
FLUID DELTA T : 1

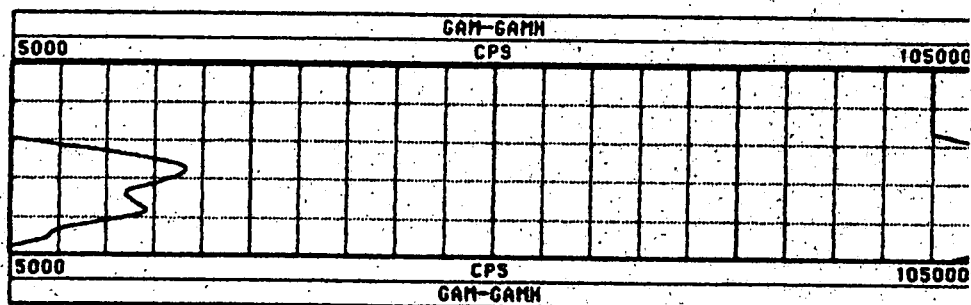
FILE : ORIGINAL  
TYPE : 9068A  
LOG : 5  
PLOT : ROCKY 0  
THRESH: 500000

ALL SERVICES PROVIDED SUBJECT TO STANDARD TERMS AND CONDITIONS



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TOOL CALIBRATION		TOOL = 9068A		SERIAL NUMBER = 642	
CAL-DATE	CAL-TIME	SRCE	SENSOR	RESPONSE	STANDARD
0 AUG23.94	08:03:25	0	GAM(NAT)	0.000 CPS	0.000 API-GR
1 AUG23.94	08:03:25	0	GAM(NAT)	197.000 CPS	200.000 API-GR



# Century GEOPHYSICAL CORP.

**B302989**

COMPANY : JACOBS ENG.  
WELL : B302989  
LOCATION/FIELD : ROCKY FLATS  
COUNTY : JEFFERSON  
STATE : COLORADO  
SECTION :

OTHER SERVICES:  
NATURAL  
GAMMA  
4 FI.

TOWNSHIP :

RANGE :

DATE : 08/24/94  
DEPTH DRILLER :  
LOG BOTTOM : 11.80  
LOG TOP : -2.00

PERMANENT DATUM :  
ELEV. PERM. DATUM :  
LOG MEASURED FROM: T.O.C.  
DEL MEASURED FROM: GL

ELEVATIONS  
KB :  
DF :  
GL :

CASING DRILLER : -  
CASING TYPE : PVC  
CASING THICKNESS: .185

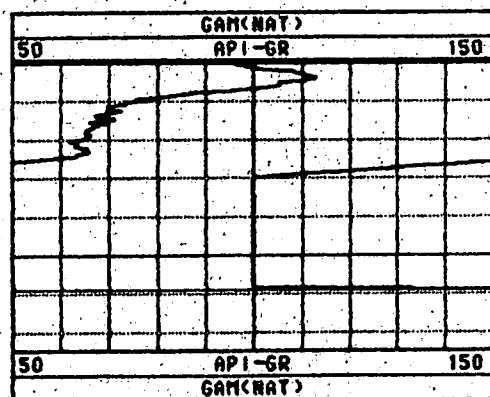
LOGGING UNIT : 9302  
FIELD OFFICE : LAS VEGAS  
RECORDED BY : R.FEDERWISCH

BIT SIZE : 8  
MAGNETIC DECL. : -  
MATRIX DENSITY : 1  
FLUID DENSITY : 1.0  
NEUTRON MATRIX : SANDSTONE  
REMARKS :

BOREHOLE FLUID : WATER  
RM : -  
RM TEMPERATURE : -  
MATRIX DELTA T : 1  
FLUID DELTA T : 1

FILE : ORIGINAL  
TYPE : 9068A  
LOG : 8  
PLOT : ROCKY 0  
THRESH: 500000

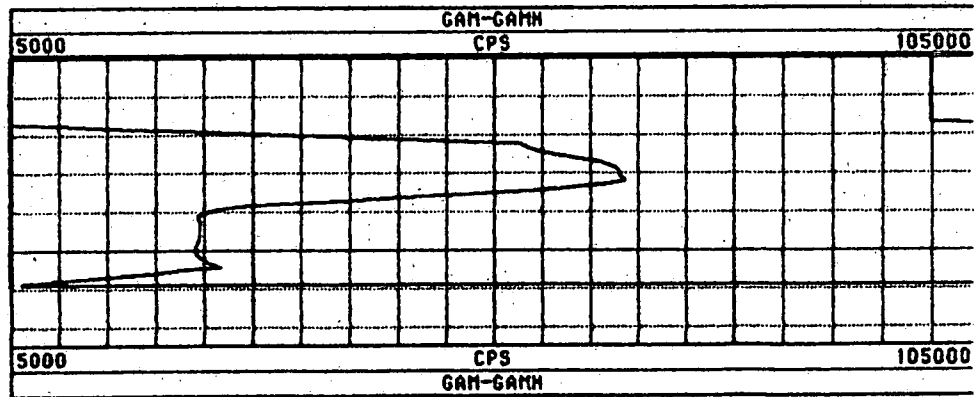
ALL SERVICES PROVIDED SUBJECT TO STANDARD TERMS AND CONDITIONS



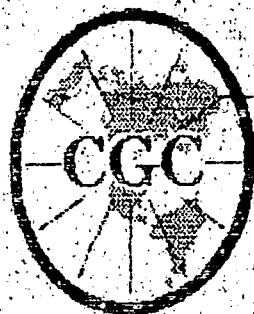
0

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15



TOOL CALIBRATION				TOOL = 9058A	SERIAL NUMBER = 642	
<u>CAL-DATE</u>	<u>CAL-TIME</u>	<u>SRCE</u>	<u>SENSOR</u>	<u>RESPONSE</u>	<u>STANDARD</u>	
0 AUG23.94	08:03:25	0	GAM(NAT)	0.000 CPS	0.000	API-GR
1 AUG23.94	08:03:25	0	GAM(NAT)	197.000 CPS	200.000	API-GR



**Century**  
**GEOPHYSICAL CORP.**

**31791**

COMPANY : JACOBS ENG.  
WELL : 31791  
LOCATION/FIELD : ROCKY FLATS  
COUNTY : JEFFERSON  
STATE : COLORADO  
SECTION :

OTHER SERVICES:  
NATURAL  
GAMMA  
4 PI

TOWNSHIP : RANGE :

DATE : 08/24/94  
DEPTH DRILLER :  
LOG BOTTOM : 16.30  
LOG TOP : -1.80

PERMANENT DATUM :  
ELEV. PERM. DATUM : KB :  
LOG MEASURED FROM: T.O.C. DF :  
DRL MEASURED FROM: GL GL :

CASING DRILLER : -  
CASING TYPE : PUC  
CASING THICKNESS: .185

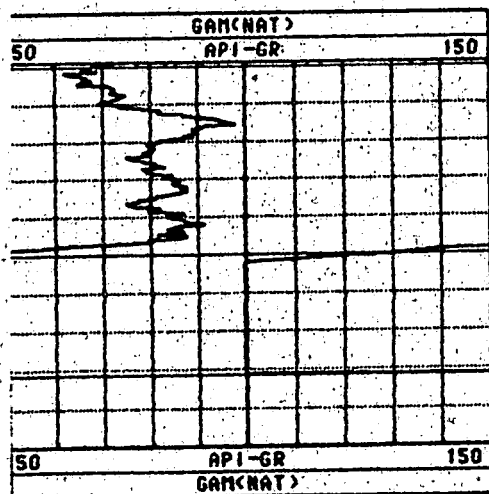
LOGGING UNIT : 9302  
FIELD OFFICE : LAS VEGAS  
RECORDED BY : R. FEDERMISCH

BIT SIZE : 8  
MAGNETIC DECL. : -  
MATRIX DENSITY : 1  
FLUID DENSITY : 1.0  
NEUTRON MATRIX : SANDSTONE  
REMARKS :

BOREHOLE FLUID : WATER  
RM : -  
RM TEMPERATURE : -  
MATRIX DELTA T : 1  
FLUID DELTA T : 1  
FILE : ORIGINAL  
TYPE : 9068A  
LOG : 9  
PLOT : ROCKY @  
THRESH: 500000

ALL SERVICES PROVIDED SUBJECT TO STANDARD TERMS AND CONDITIONS

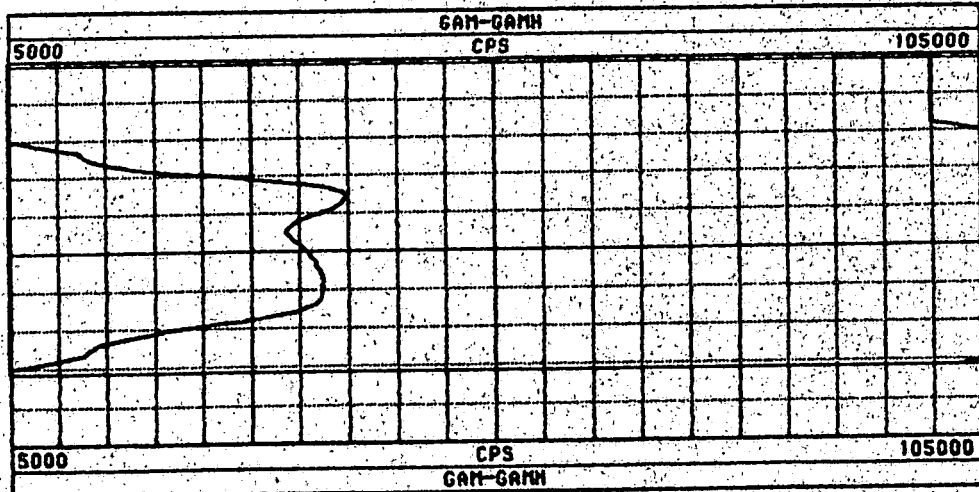




0

10

20



TOOL CALIBRATION		TOOL = 9068A		SERIAL NUMBER = 642	
CAL-DATE	CAL-TIME	SRCE	SENSOR	RESPONSE	STANDARD
0 AUG23.94	08:03:25	0	GAM(NAT)	0.000 CPS	0.000 API-GR
1 AUG23.94	08:03:25	0	GAM(NAT)	197.000 CPS	200.000 API-GR



*Century*  
GEOPHYSICAL CORP.

35691

COMPANY : JACOBS ENG.  
WELL : 35691  
LOCATION/FIELD : ROCKY FLATS  
COUNTY : JEFFERSON  
STATE : COLORADO  
SECTION :

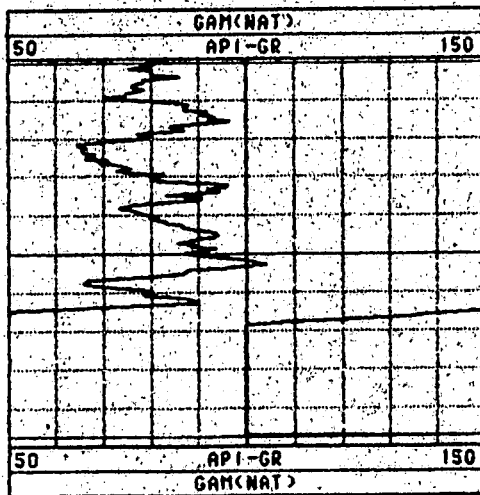
OTHER SERVICES:  
NATURAL  
GAMMA  
4.51

TOWNSHIP : RANGE :  
DATE : 08/25/94 PERMANENT DATUM : ELEVATIONS  
DEPTH DRILLER : ELEV. PERM. DATUM : XB  
LOG BOTTOM : 19.50 LOG MEASURED FROM : T.D.C. : DF  
LOG TOP : 2.00 DRL MEASURED FROM : GL : GL

CASING DRILLER : LOGGING UNIT : 9362  
CASING TYPE : PVC FIELD OFFICE : LAS VEGAS  
CASING THICKNESS : .185 RECORDED BY : R. FEDERWISCH

BIT SIZE : 8 BOREHOLE FLUID : WATER FILE : ORIGINAL  
MAGNETIC DEVL. : - RH : - TYPE : 9550H  
MATRIX DENSITY : 1 RH TEMPERATURE : LOG : 3  
FLUID DENSITY : 1.0 MATRIX DELTA T : 1 PLOT : ROCKY 0  
NEUTRON MATRIX : SANDSTONE FLUID DELTA T : 1 THRESH : 500000  
REMARKS :

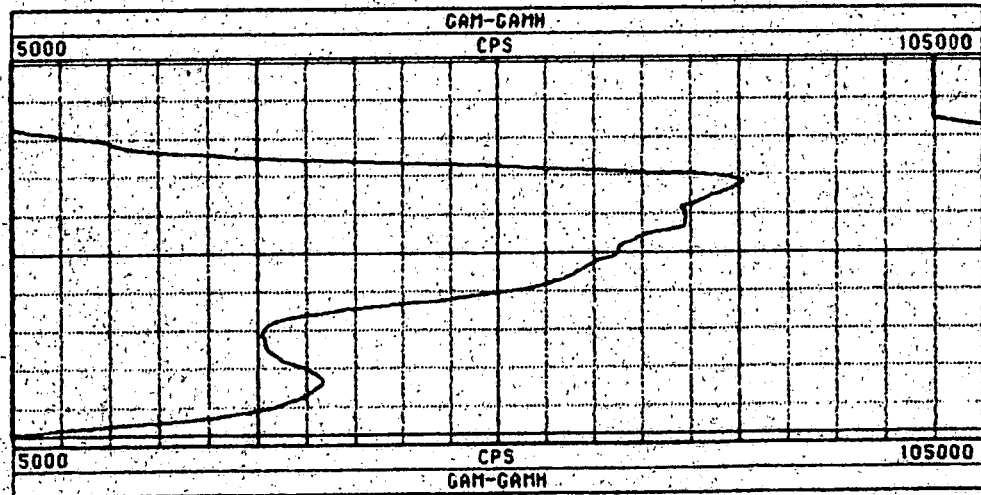
ALL SERVICES PROVIDED SUBJECT TO STANDARD TERMS AND CONDITIONS



0

10

20



TOOL CALIBRATION		TOOL = 9063H		SERIAL NUMBER = 642		
<u>CAL-DATE</u>	<u>CAL-TIME</u>	<u>SRC</u>	<u>SENSOR</u>	<u>RESPONSE</u>	<u>STANDARD</u>	
0	08/23/94	08:03:25	0	GAM(NAT)	0.000 CPS	0.000 API-GR
1	08/23/94	08:03:25	0	GAM(NAT)	197.000 CPS	200.000 API-GR



# Century GEOPHYSICAL CORP.

24193

COMPANY : JACOBS INC.  
WELL : 24193  
LOCATION/FIELD : ROCKY FLATS  
COUNTY : JEFFERSON  
STATE : COLORADO  
SECTION :

OTHER SERVICES :  
NATURAL  
GAMMA  
4 PI

TOWNSHIP :

RANGE :

DATE : 8/25/93  
DEPTH DRILLER :  
LOG BOTTOM : 77.28  
LOG TOP : 8.48

PERMANENT DATUM :  
ELEV. PERM. DATUM :  
LOG MEASURED FROM : T.D.C.  
ECL MEASURED FROM : CL

ELEVATIONS :  
KB :  
BT :  
CL :

CASING DRILLER :  
CASING TYPE : PVC  
CASING THICKNESS : .165

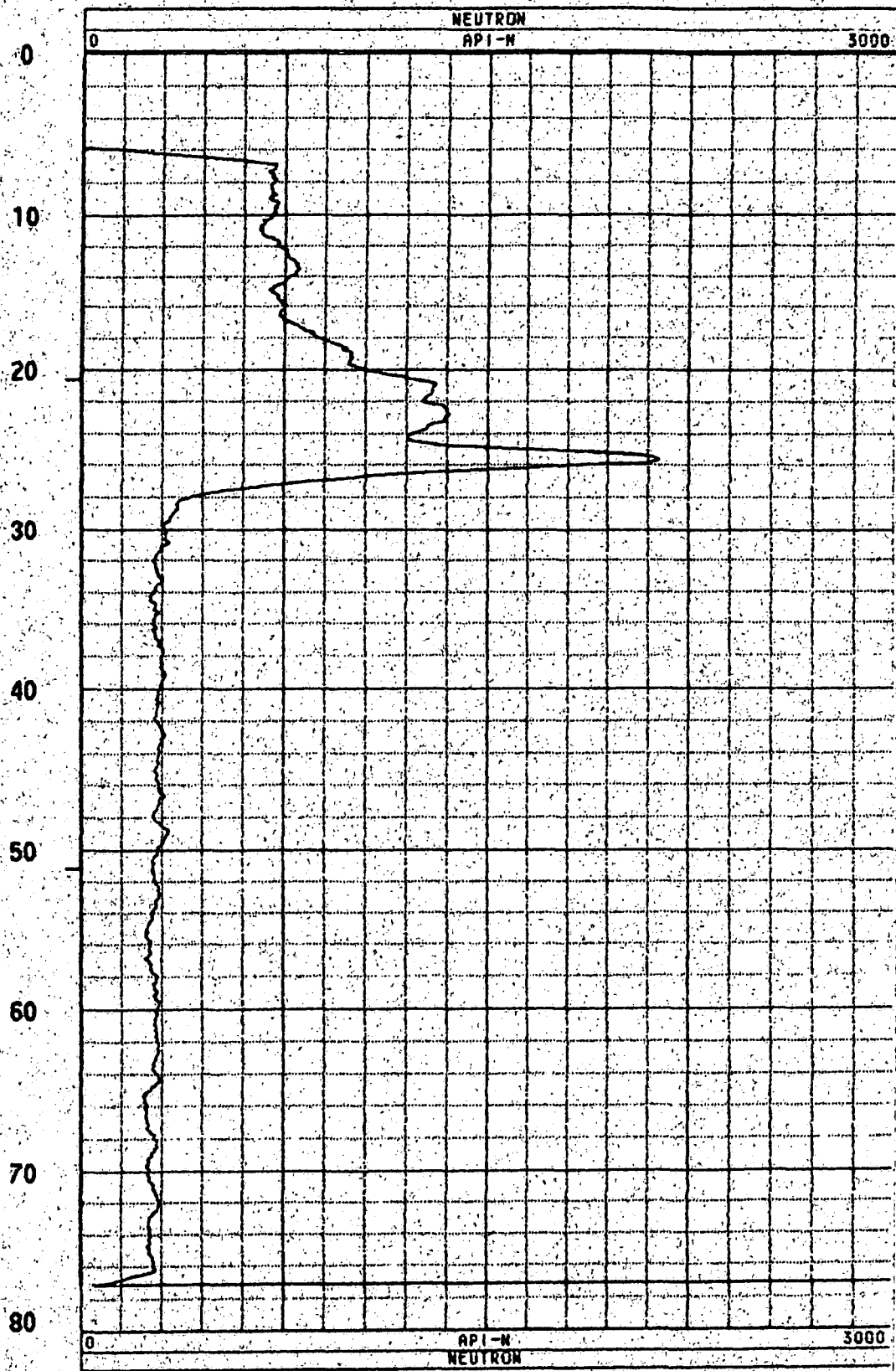
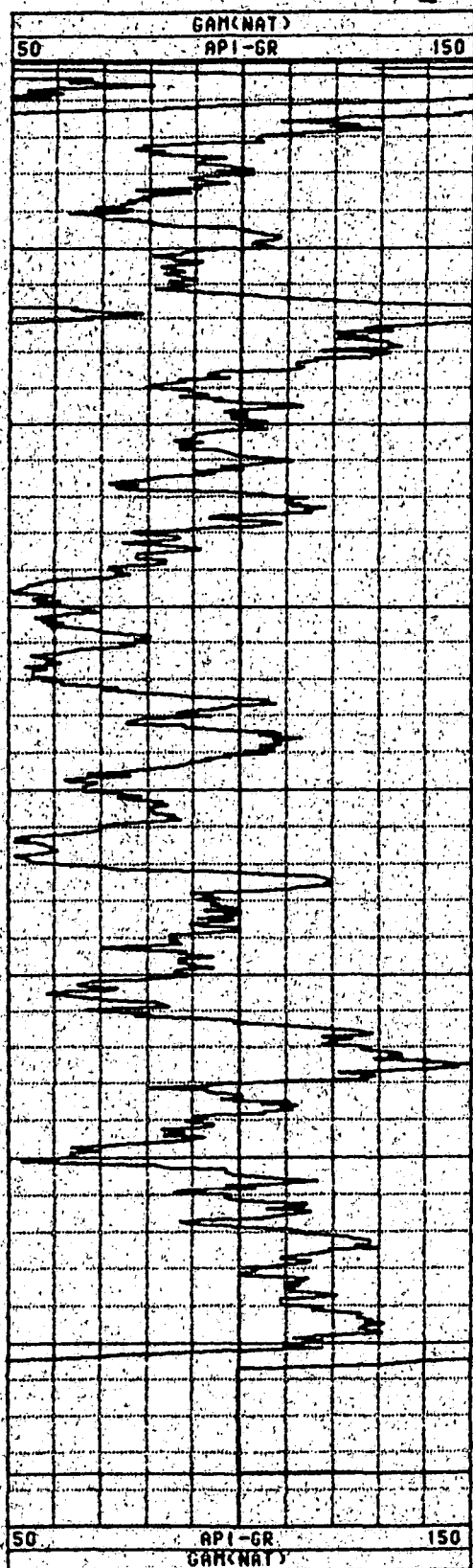
LOGGING UNIT : 9362  
FIELD OFFICE : LAS VEGAS  
RECORDED BY : R. FEDERHACH

BIT SIZE : 8  
MAGNETIC DECL. :  
MATRIX DENSITY : 1  
FLUID DENSITY : 1.8  
NEUTRON MATRIX : SANDSTONE  
REMARKS :

BOREHOLE FLUID : WATER  
RM :  
RM TEMPERATURE :  
MATRIX DELTA T : 1  
FLUID DELTA T : 1

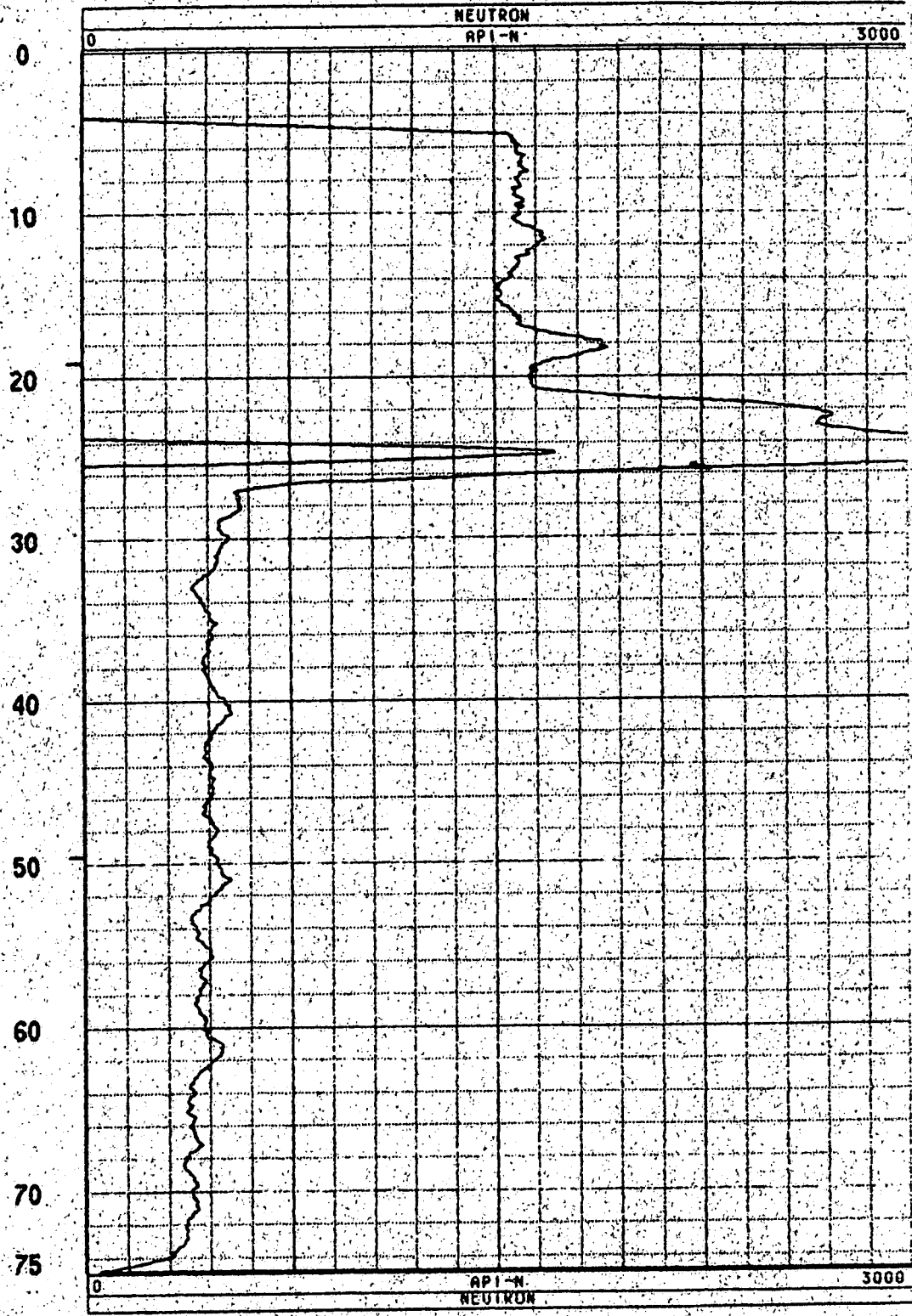
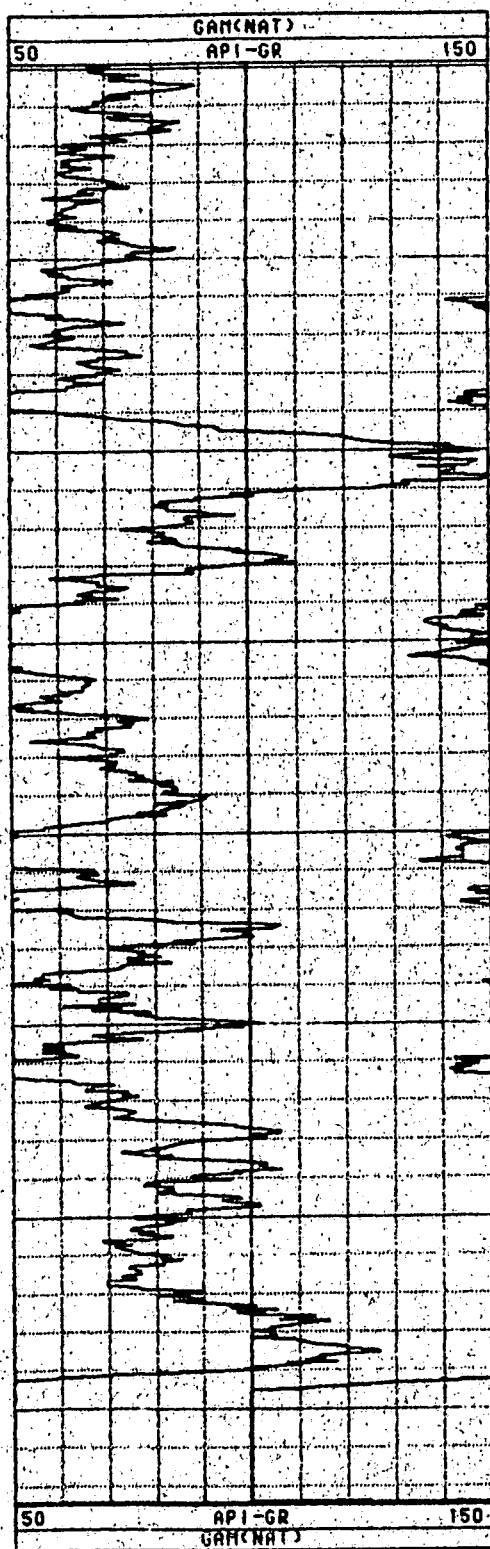
FILE : ORIGINAL  
TYPE : 9867A  
LOG : 4  
PLOT : ROCKY 1  
THRESH : 500000

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# Century GEOPHYSICAL CORP.

**69194**

COMPANY : JACOBS ENG.  
WELL : 69194  
LOCATION/FIELD : SEP  
COUNTY : JEFFERSON  
STATE : COLORADO  
SECTION :

OTHER SERVICES:

TOWNSHIP :

RANGE :

DATE : 09/21/9  
DEPTH DRILLER : 190  
LOG BOTTOM :  
LOG TOP :

PERMANENT DATUM :  
ELEV. PERM. DATUM :  
LOG MEASURED FROM: G.L.  
DRL MEASURED FROM:

ELEVATIONS:  
KB :  
DF :  
GL :

CASING DRILLER :  
CASING TYPE : PVC  
CASING THICKNESS:

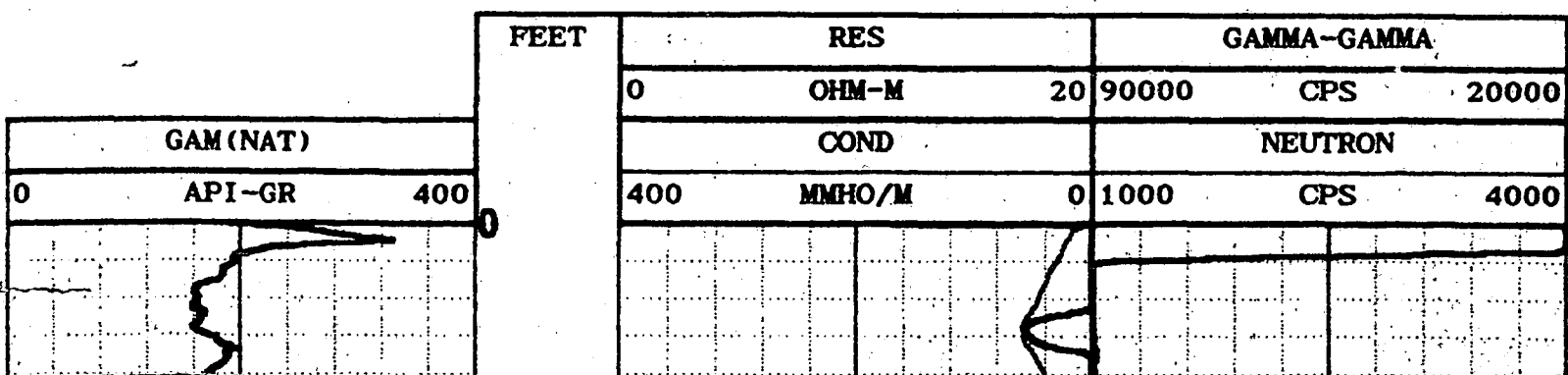
LOGGING UNIT : 930  
FIELD OFFICE : LAS VEGAS  
RECORDED BY : FEDERWISCH

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MAGNETIC DECL. :  
MATRIX DENSITY :  
FLUID DENSITY :  
NEUTRON MATRIX :  
REMARKS:

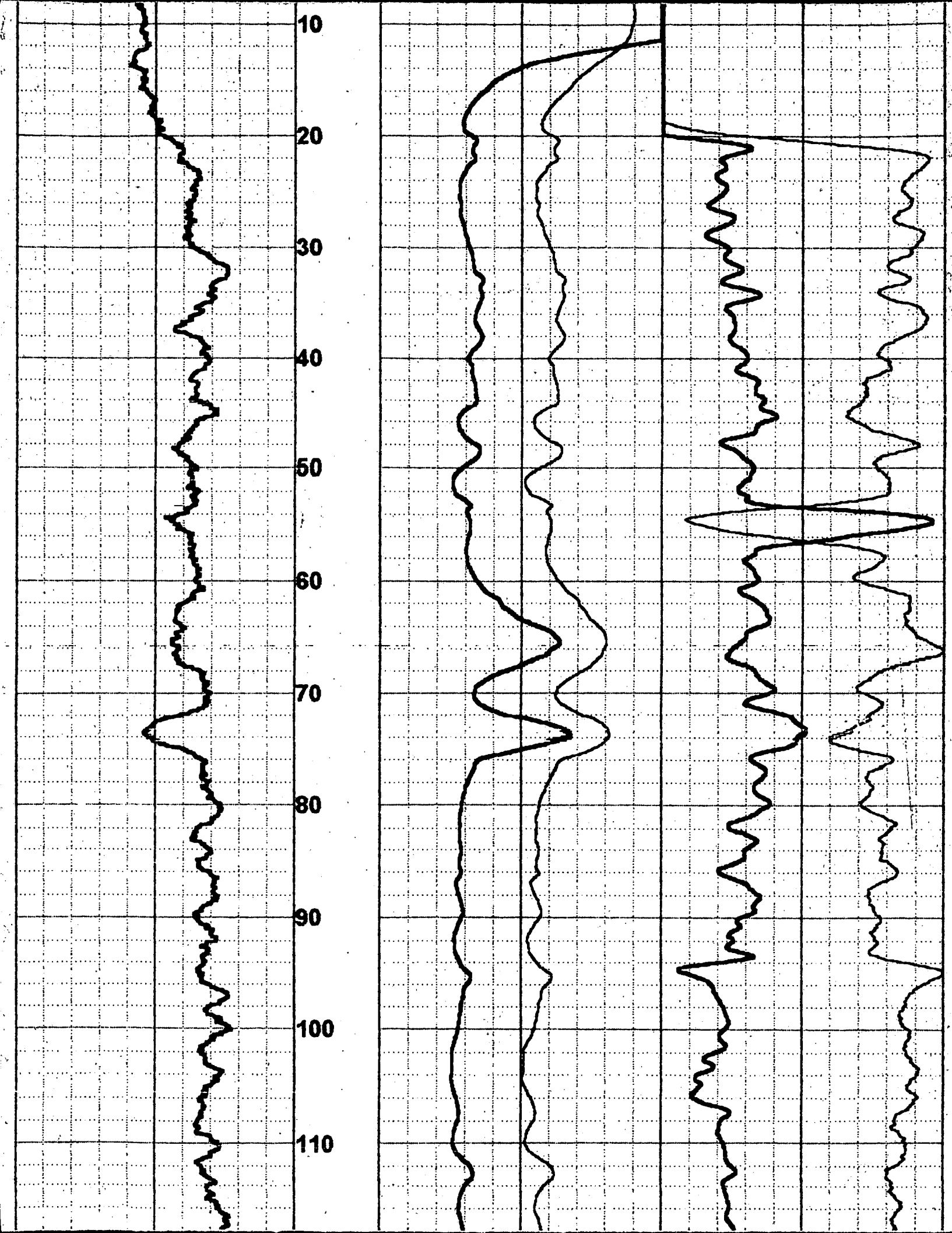
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RM :  
RM TEMPERATURE :  
MATRIX DELTA T :  
FLUID DELTA T :

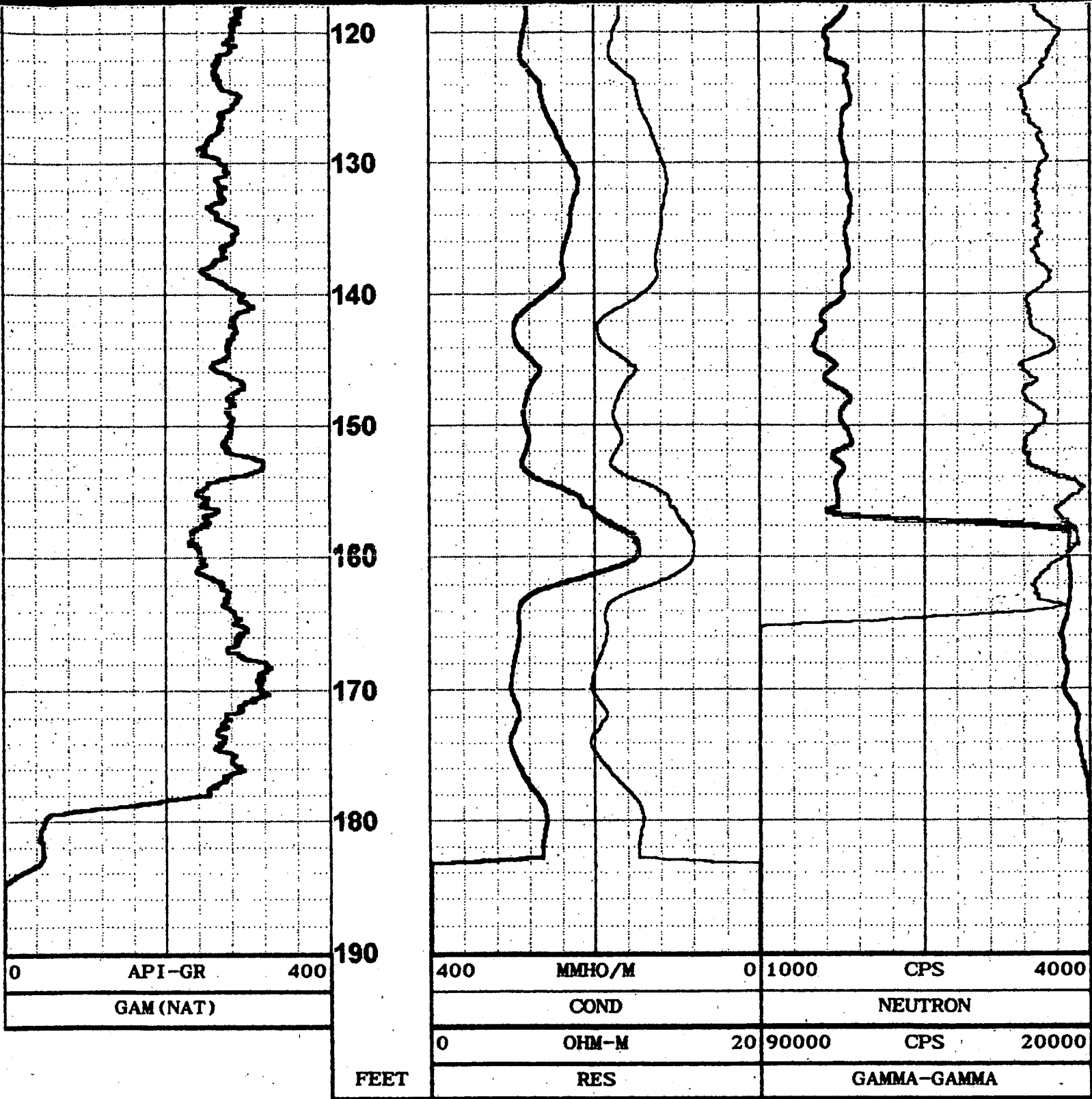
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TYPE :  
LOG : 69194  
PLOT :  
THRESH:

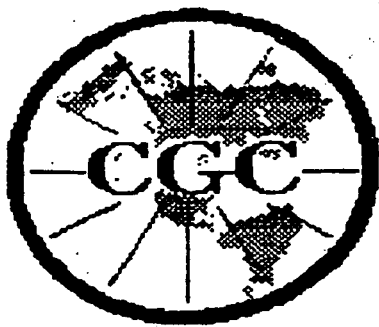
ALL SERVICES PROVIDED SUBJECT TO STANDARD TERMS AND CONDITIONS











# Century GEOPHYSICAL CORP.

**69294**

COMPANY : JACOBS ENG.  
WELL : 69294  
LOCATION/FIELD : SEP.  
COUNTY : JEFFERSON  
STATE : COLORADO  
SECTION :

OTHER SERVICES:

DATE : 09/21/94  
DEPTH DRILLER : 240  
LOG BOTTOM :  
LOG TOP :

TOWNSHIP : RANGE :

PERMANENT DATUM :  
ELEV. PERM. DATUM :  
LOG MEASURED FROM: G.L.  
DRL MEASURED FROM:  
ELEVATIONS:  
KB :  
DF :  
GL :

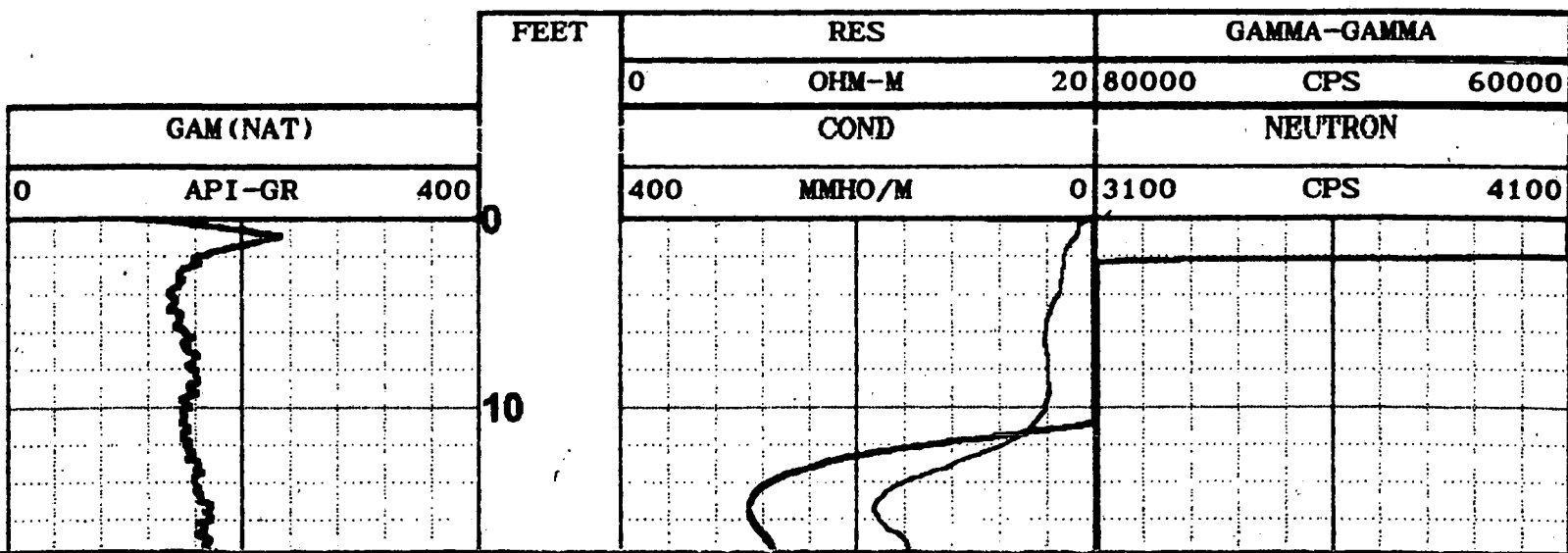
CASING DRILLER :  
CASING TYPE : PVC  
CASING THICKNESS:

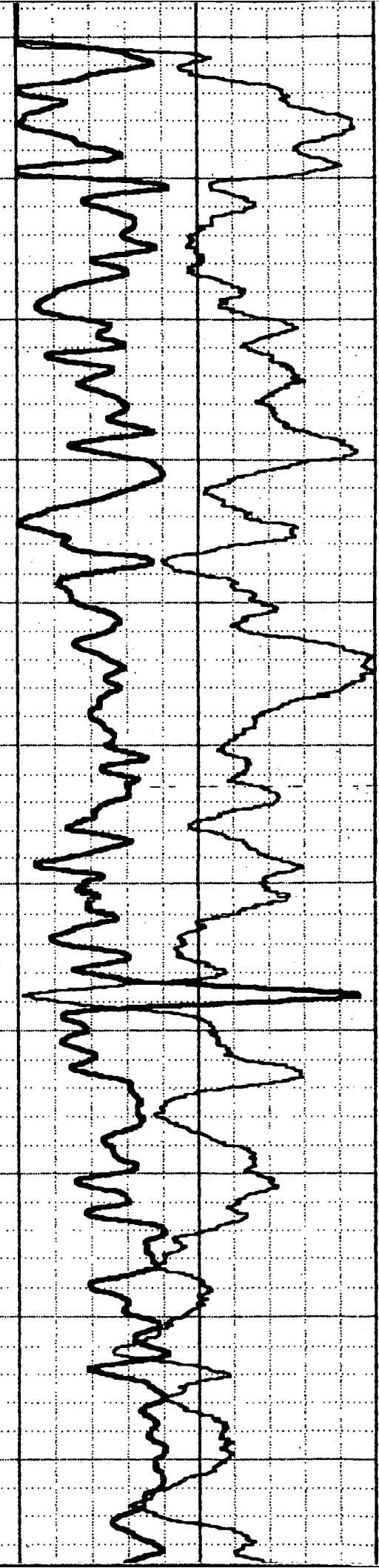
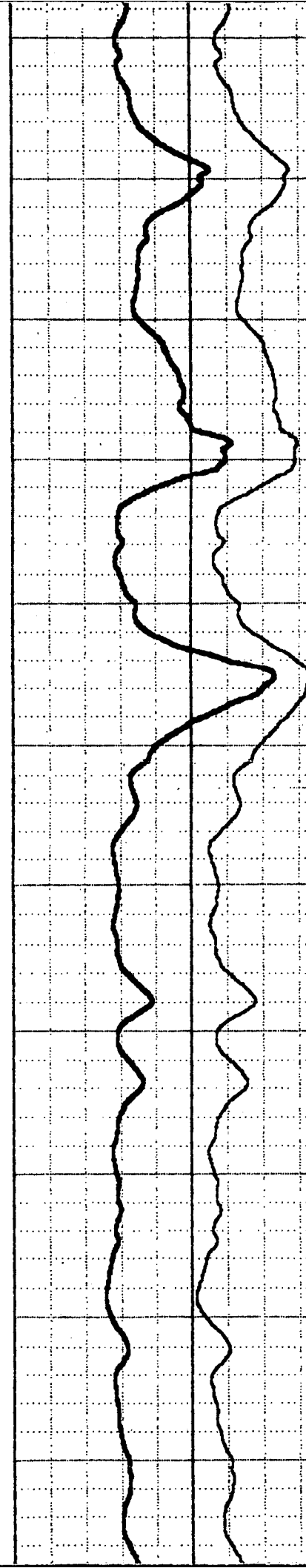
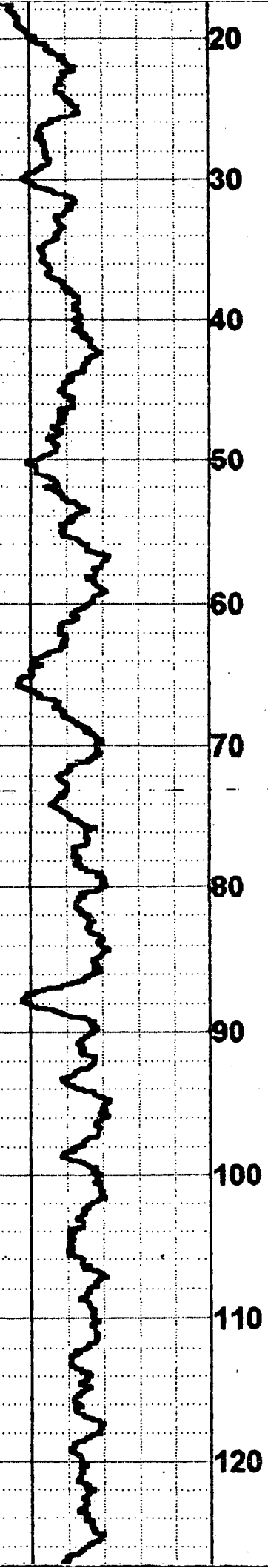
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FIELD OFFICE : LAS VEGAS  
RECORDED BY : R. FEDERWIS

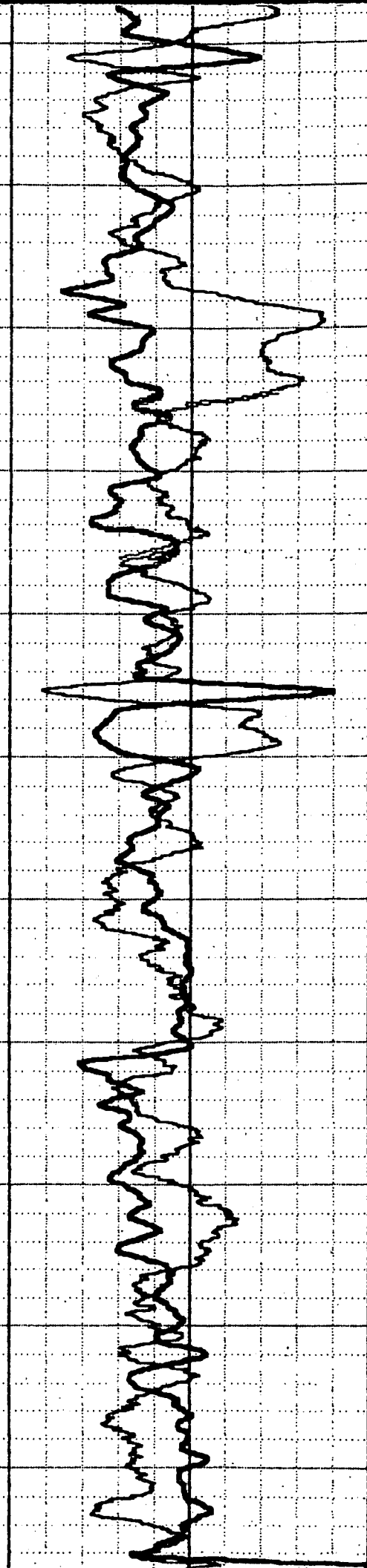
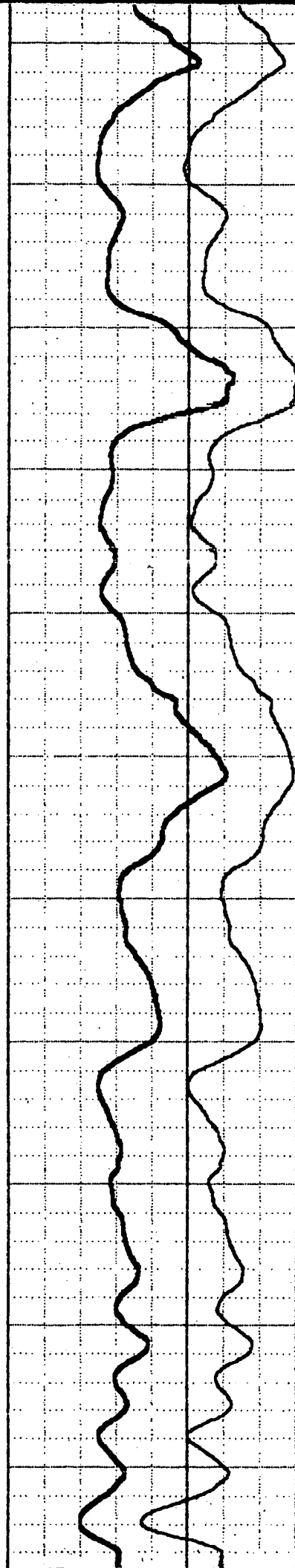
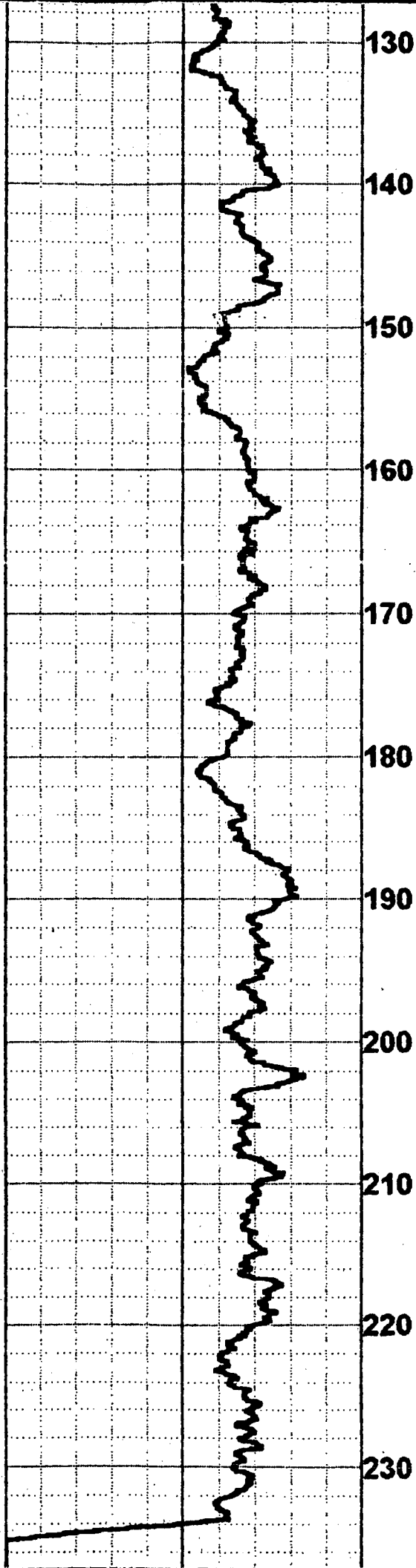
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MATRIX DENSITY :  
FLUID DENSITY :  
NEUTRON MATRIX :  
REMARKS:

BOREHOLE FLUID : AIR  
RM :  
RM TEMPERATURE :  
MATRIX DELTA T :  
FLUID DELTA T :  
FILE :  
TYPE :  
LOG : 69294  
PLOT :  
THRESH:

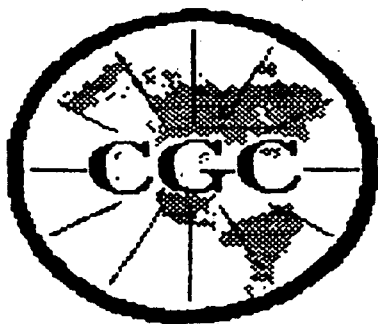
ALL SERVICES PROVIDED SUBJECT TO STANDARD TERMS AND CONDITIONS







		240				
0	API-GR		400	400	MMHO/M	0 3100 CPS 4100
GAM (NAT)			COND		NEUTRON	
			0	OHM-M	20	80000 CPS 60000
			RES		GAMMA-GAMMA	
		FEET				



# Century GEOPHYSICAL CORP.

**69394**

COMPANY : JACOBS ENG.  
WELL : 69394  
LOCATION/FIELD : SEP  
COUNTY : JEFFERSON  
STATE : COLORADO  
SECTION :

OTHER SERVICES:

DATE : 09/21/9  
DEPTH DRILLER : 240  
LOG BOTTOM :  
LOG TOP :

TOWNSHIP :

RANGE :

PERMANENT DATUM :  
ELEV. PERM. DATUM :  
LOG MEASURED FROM: G.L.  
DRL MEASURED FROM:

ELEVATIONS:  
KB :  
DF :  
GL :

CASING DRILLER :  
CASING TYPE : PVC  
CASING THICKNESS:

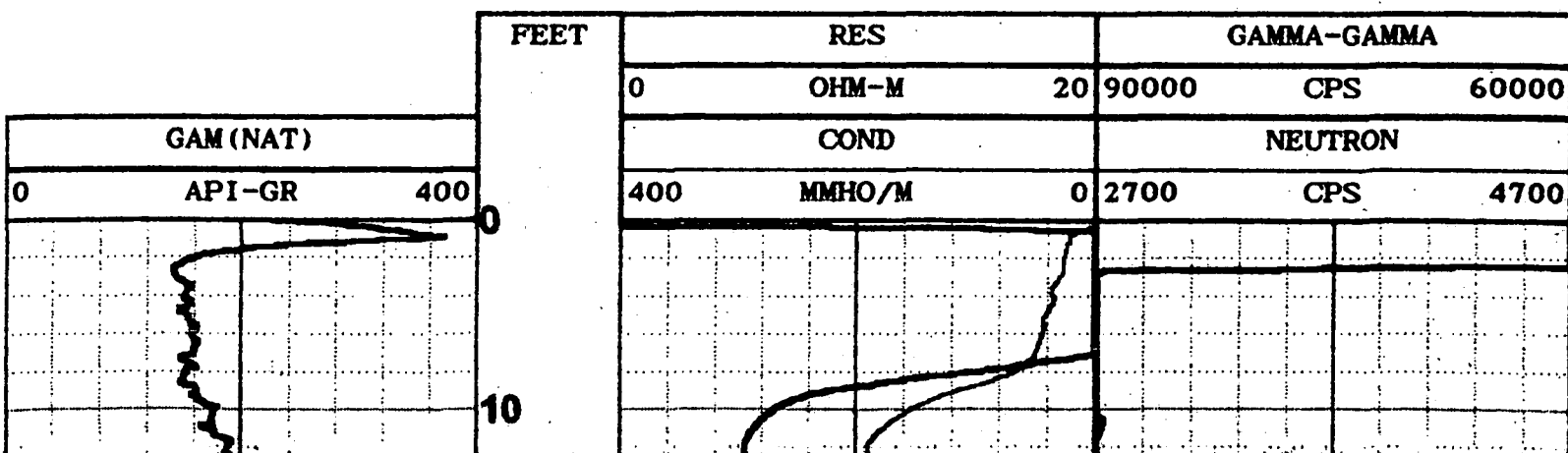
LOGGING UNIT : 9302  
FIELD OFFICE : LAS VEGAS  
RECORDED BY : FEDERWISCH

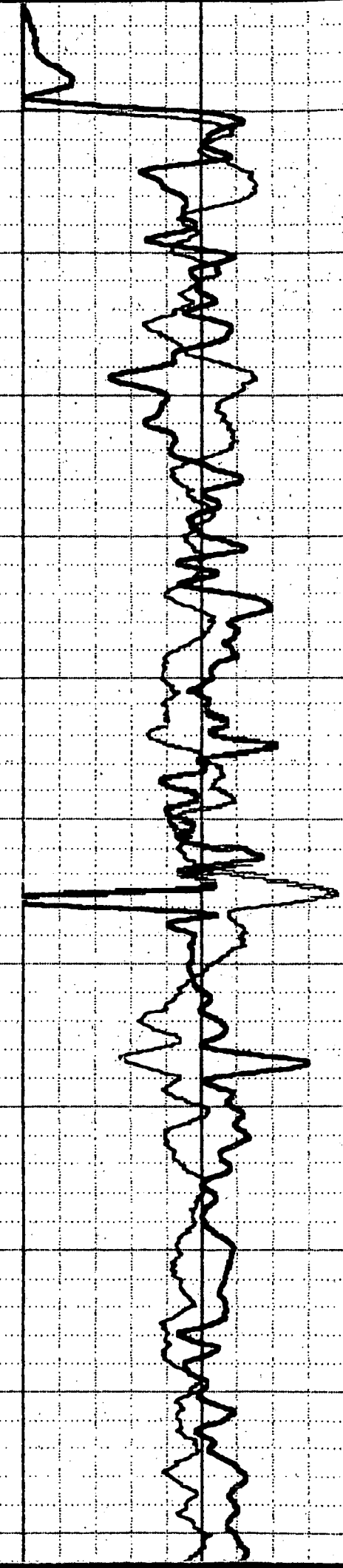
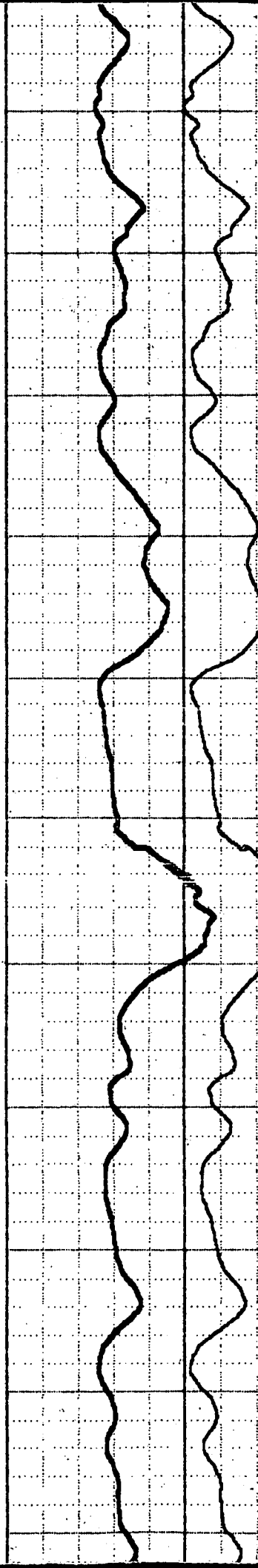
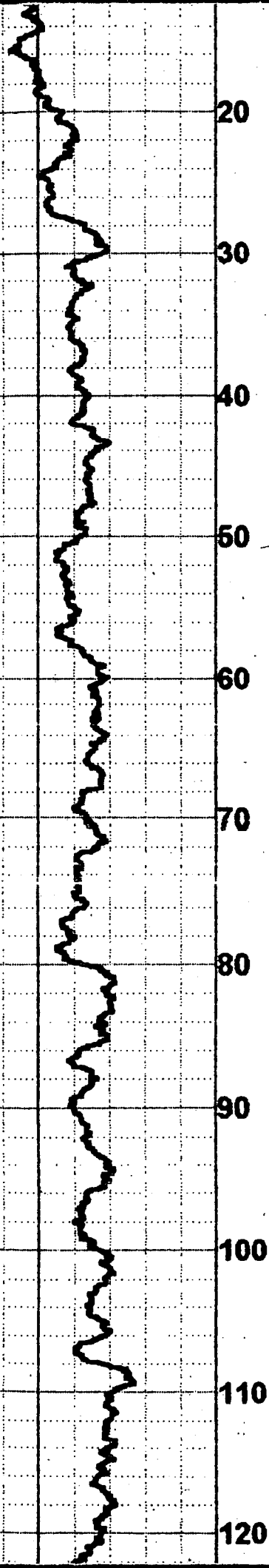
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MATRIX DENSITY :  
FLUID DENSITY :  
NEUTRON MATRIX :  
REMARKS:

BOREHOLE FLUID : AIR  
RM :  
RM TEMPERATURE :  
MATRIX DELTA T :  
FLUID DELTA T :

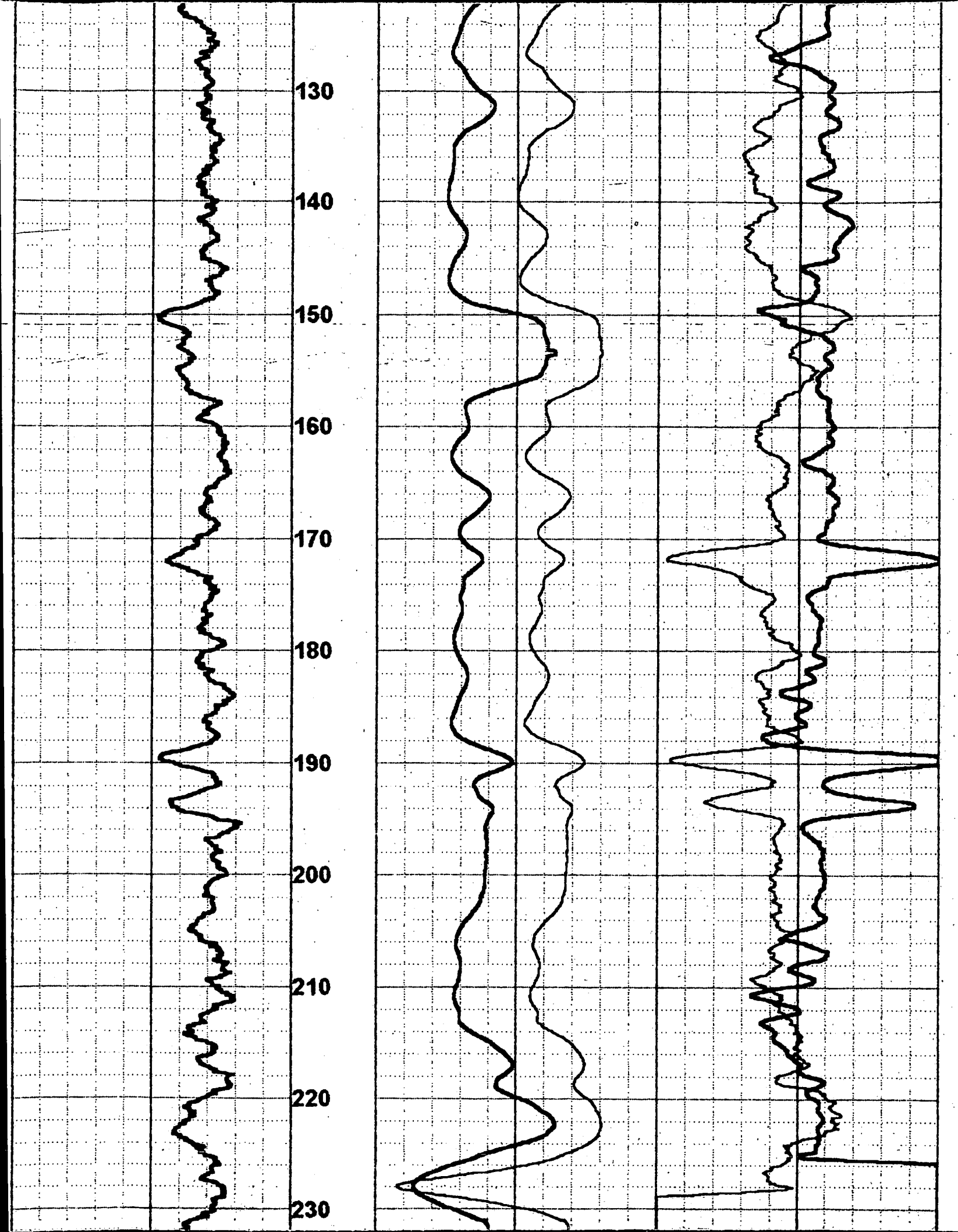
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TYPE :  
LOG : 69394  
PLOT :  
THRESH:

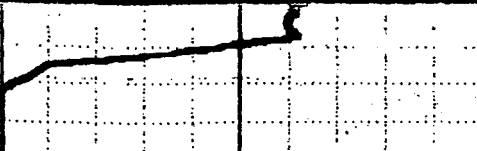
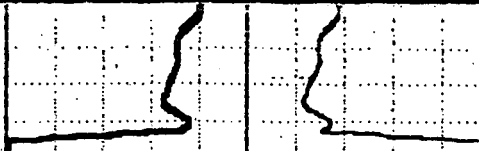
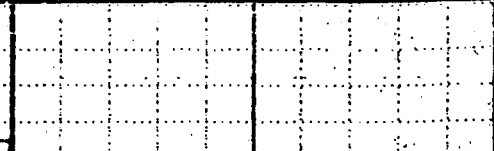
ALL SERVICES PROVIDED SUBJECT TO STANDARD TERMS AND CONDITIONS

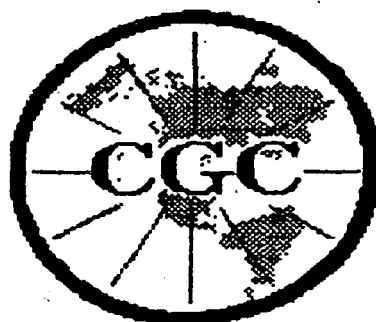








			240						
0	API-GR	400		400	MMHO/M	0	2700	CPS	4700
GAM (NAT)				COND			NEUTRON		
				0	OHM-M	20	90000	CPS	60000
				RES			GAMMA-GAMMA		
			FEET						



# Century

## GEOPHYSICAL CORP.

**69494**

COMPANY : JACOBS ENG.  
WELL : 69494  
LOCATION/FIELD : SEP  
COUNTY : JEFFERSON  
STATE : COLORADO  
SECTION :

OTHER SERVICES:

DATE : 09/21/94  
DEPTH DRILLER : 220  
LOG BOTTOM :  
LOG TOP :

TOWNSHIP : RANGE :

PERMANENT DATUM :  
ELEV. PERM. DATUM :  
LOG MEASURED FROM: G.L.  
DRL MEASURED FROM:

ELEVATIONS:  
KB :  
DF :  
GL :

CASING DRILLER :  
CASING TYPE : PVC  
CASING THICKNESS:

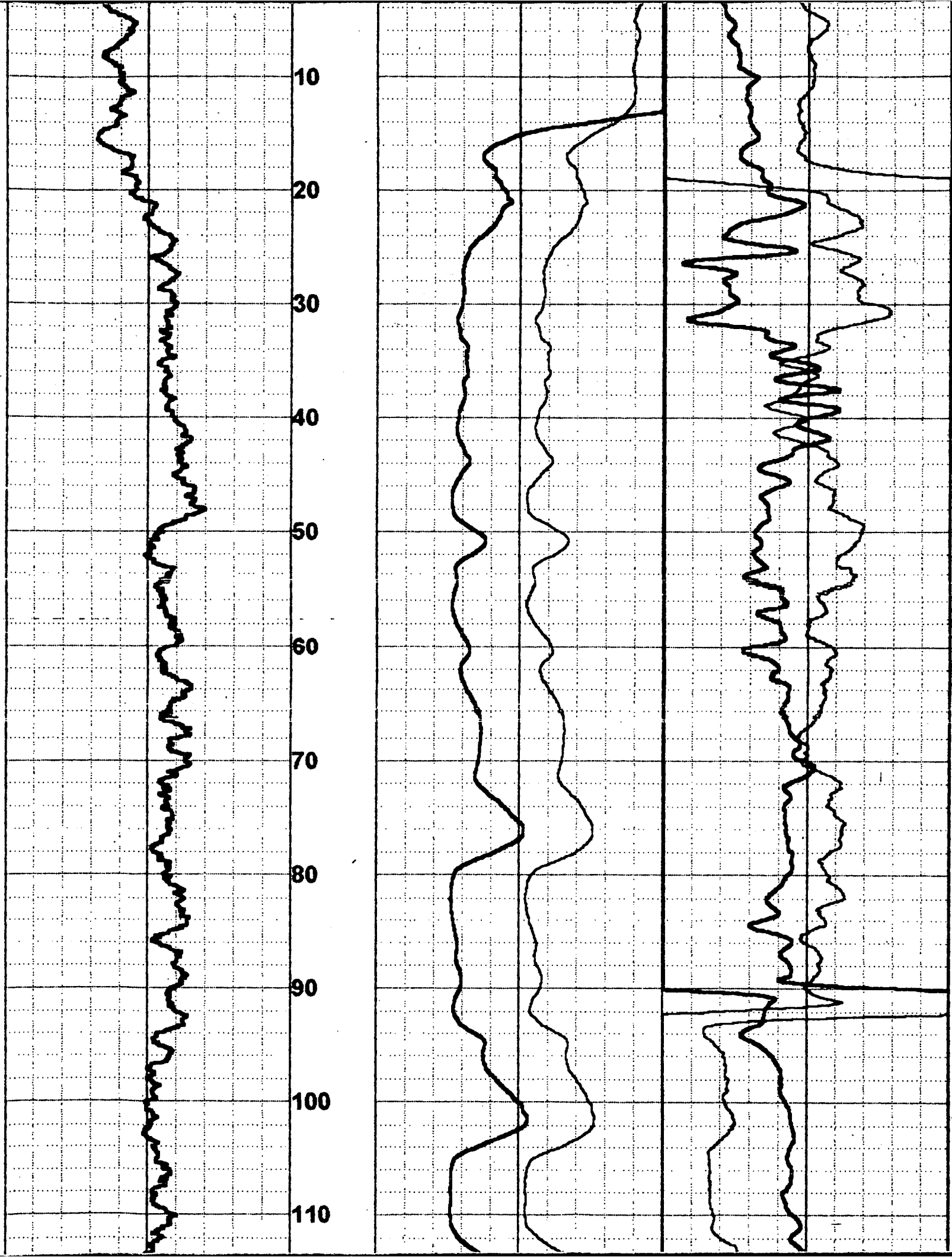
LOGGING UNIT : 9302  
FIELD OFFICE : LAS VEGAS  
RECORDED BY : FEDERWISCH

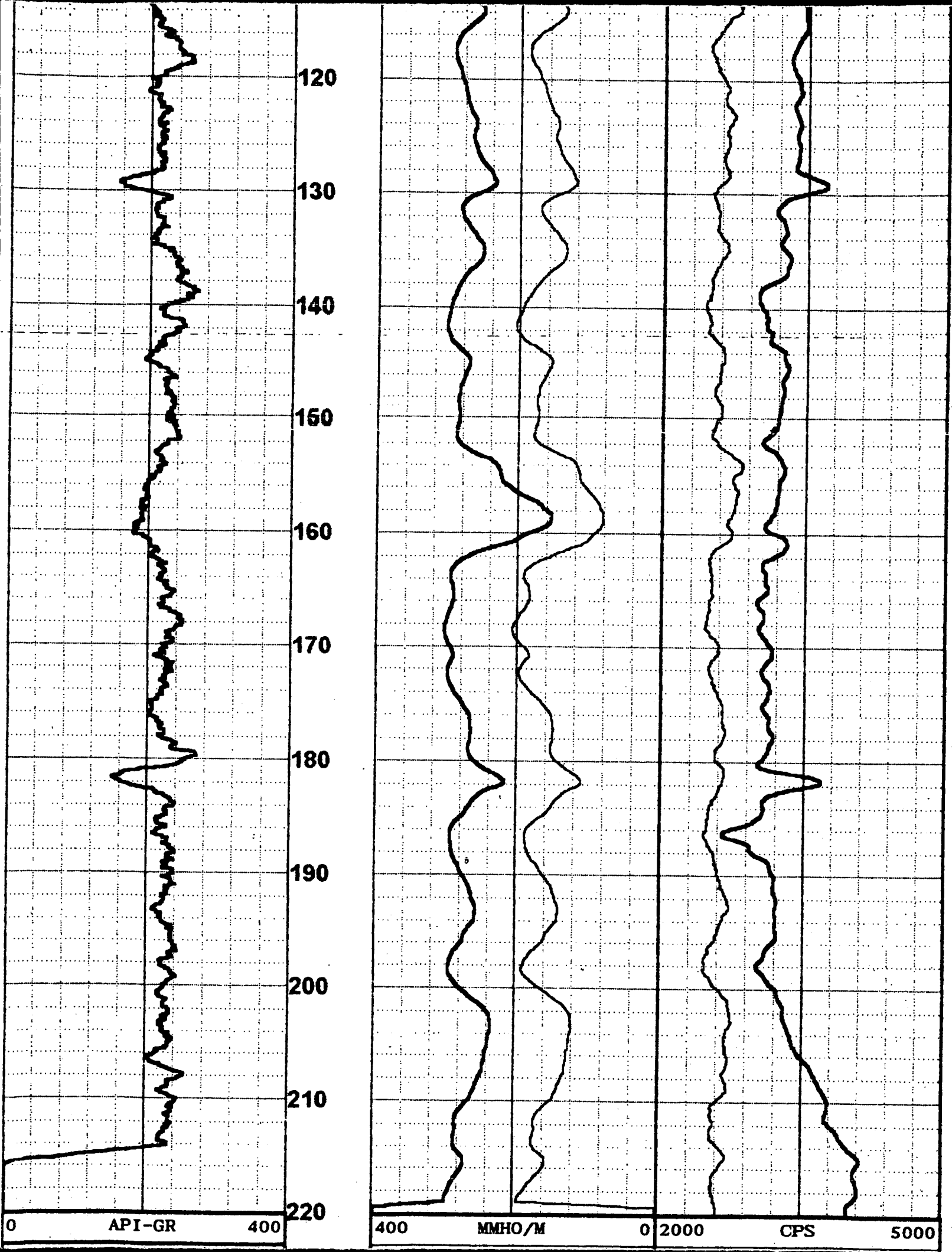
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MATRIX DENSITY :  
FLUID DENSITY :  
NEUTRON MATRIX :  
REMARKS:

BOREHOLE FLUID : H2O/WATE  
RM :  
RM TEMPERATURE :  
MATRIX DELTA T :  
FLUID DELTA T :  
FILE :  
TYPE :  
LOG : 69494  
PLOT :  
THRESH:

ALL SERVICES PROVIDED SUBJECT TO STANDARD TERMS AND CONDITIONS

GAM (NAT)			RES			NEUTRON		
0	API-GR	400	0	OHM-M	20	0	CPS	2000
						GAMMA-GAMMA		
						40000	CPS	0
						GAMMA-GAMMA		
						100000	CPS	40000
						NEUTRON		
			400	MMHO/M	0	2000	CPS	5000





GAM (NAT)

COND

NEUTRON

0

OHM-M

20

100000

CPS

40000

RES

GAMMA-GAMMA

40000

CPS

0

GAMMA-GAMMA

0

CPS

2000

NEUTRON

FEET



# Century

## GEOPHYSICAL CORP.

**69594**

COMPANY : JACOBS ENG.  
WELL : 69594  
LOCATION/FIELD : SEP  
COUNTY : JEFFERSON  
STATE : COLORADO  
SECTION :

OTHER SERVICES:

DATE : 09/21/9  
DEPTH DRILLER : 165  
LOG BOTTOM :  
LOG TOP :

TOWNSHIP : RANGE :

PERMANENT DATUM :  
ELEV. PERM. DATUM :  
LOG MEASURED FROM: G.L.  
DRL MEASURED FROM:  
ELEVATIONS:  
KB :  
DF :  
GL :

CASING DRILLER :  
CASING TYPE : PVC  
CASING THICKNESS:

LOGGING UNIT : 9302  
FIELD OFFICE : LAS VEGAS  
RECORDED BY : FEDERWISCH

BIT SIZE : 5.5  
MAGNETIC DECL. :  
MATRIX DENSITY :  
FLUID DENSITY :  
NEUTRON MATRIX :  
REMARKS:

BOREHOLE FLUID :  
RM :  
RM TEMPERATURE :  
MATRIX DELTA T :  
FLUID DELTA T :  
FILE :  
TYPE :  
LOG : 69594  
PLOT :  
THRESH:

ALL SERVICES PROVIDED SUBJECT TO STANDARD TERMS AND CONDITIONS

FEET

NEUTRON

0 CPS 2000

GAMMA-GAMMA

40000 CPS 0

RES

GAMMA-GAMMA

0 OHM-M 20 90000 CPS 40000

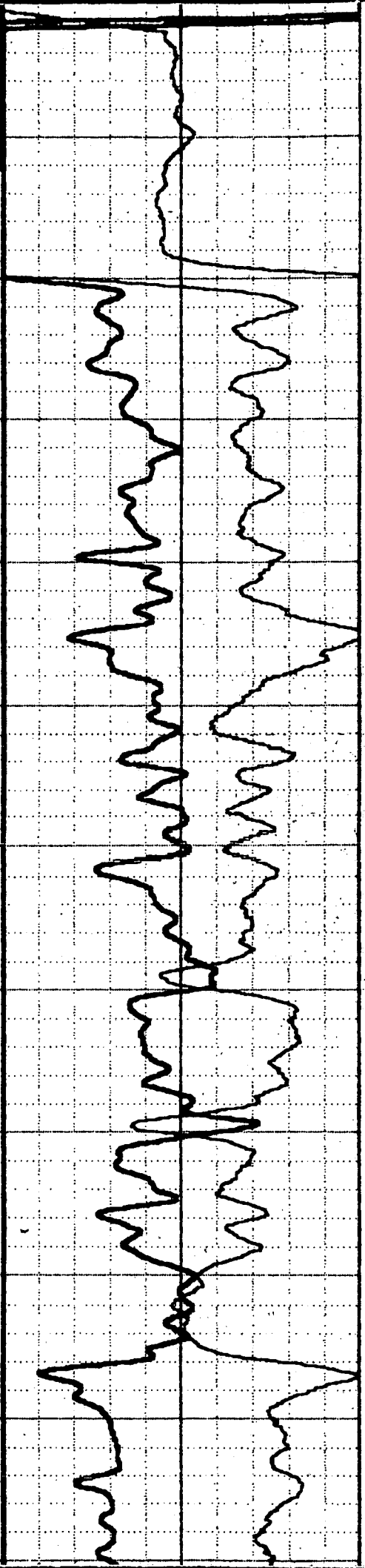
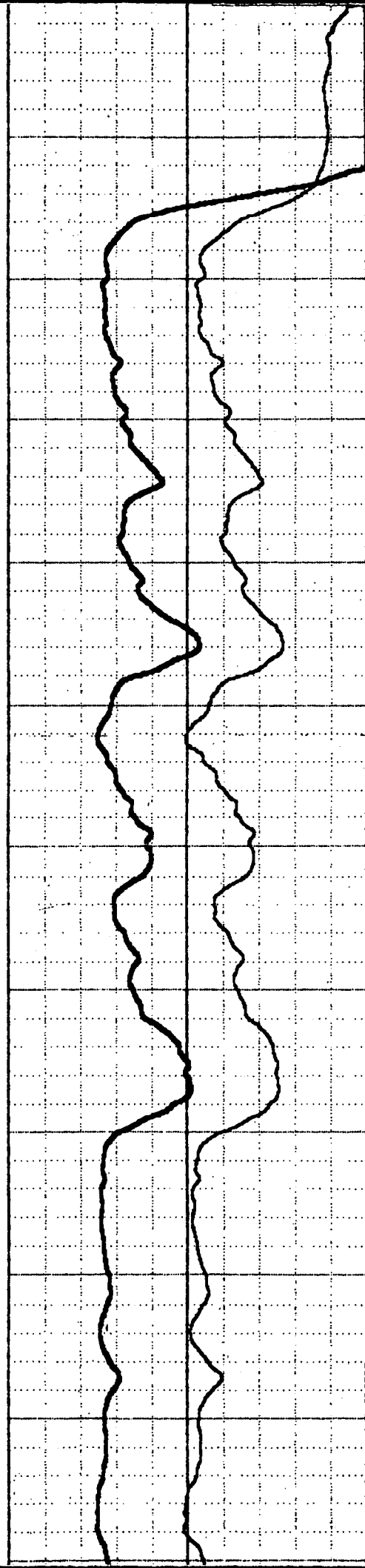
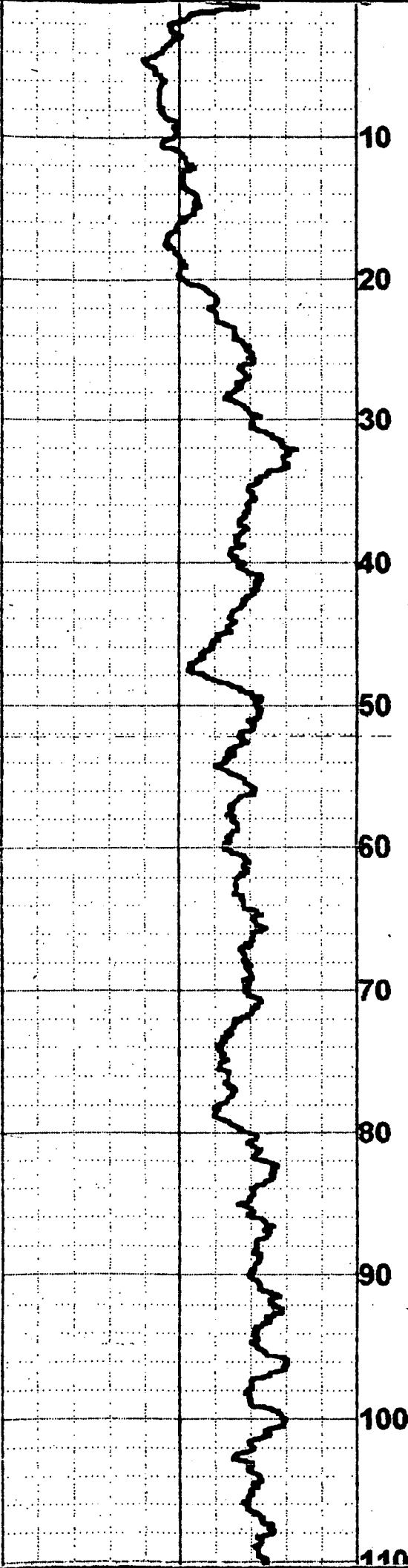
COND

NEUTRON

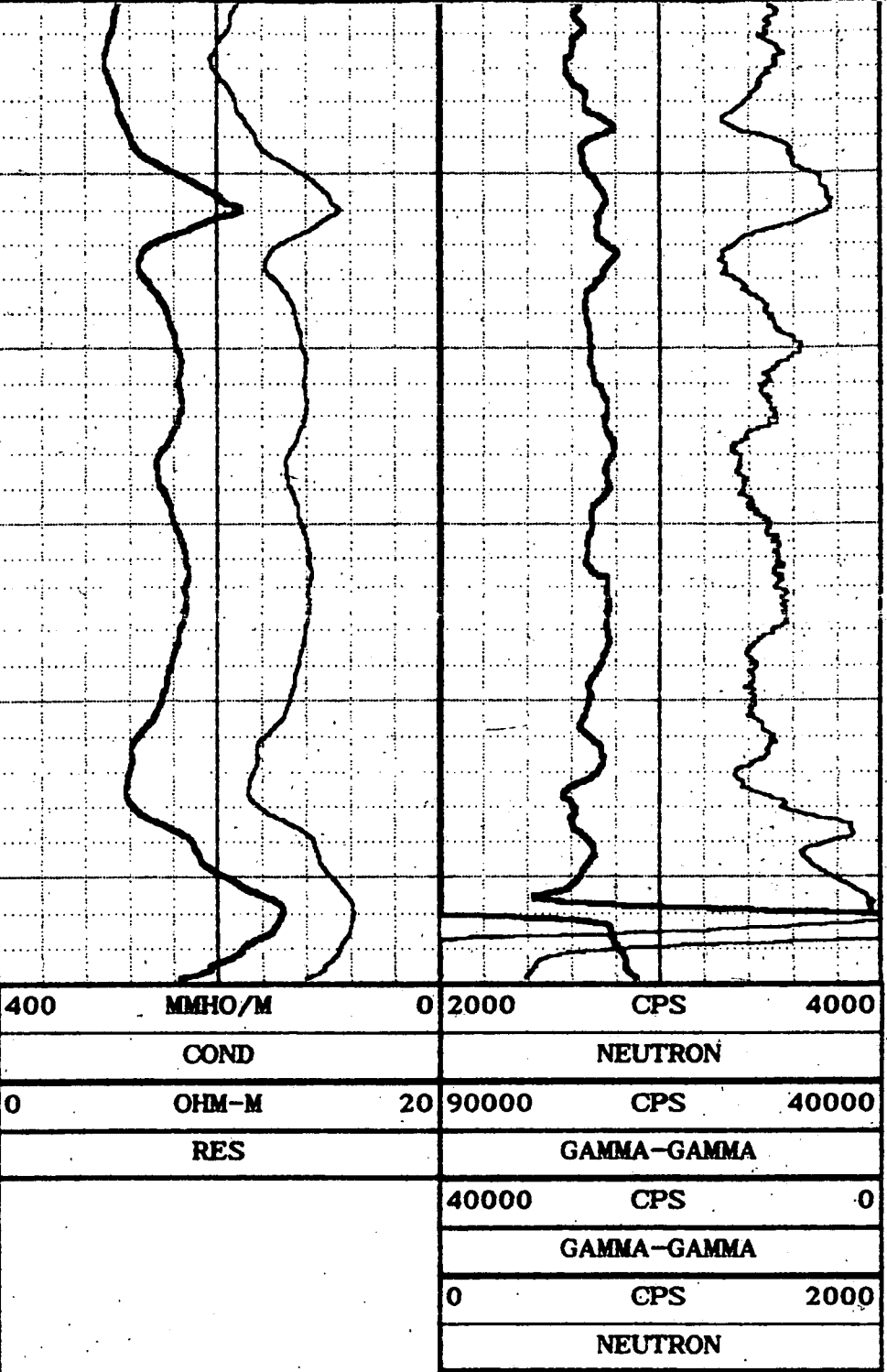
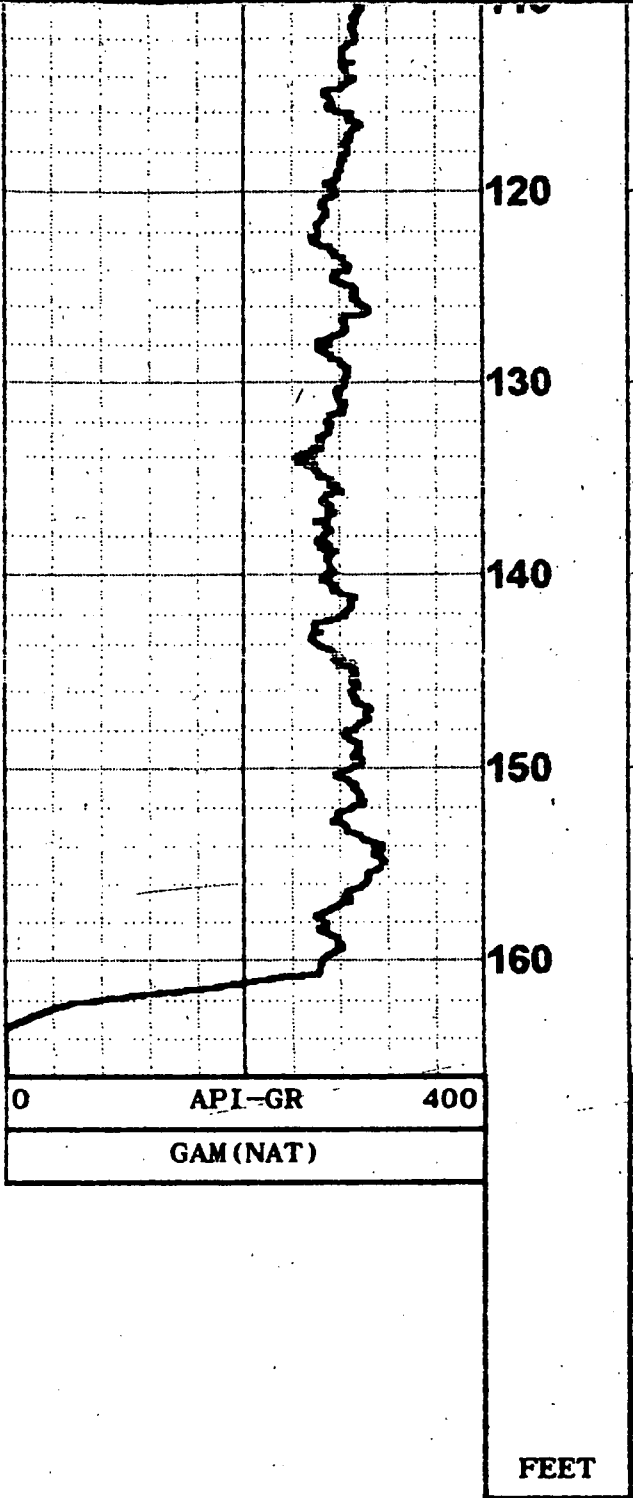
400 MMHO/M 0 2000 CPS 4000

GAM (NAT)

0 API-GR 400



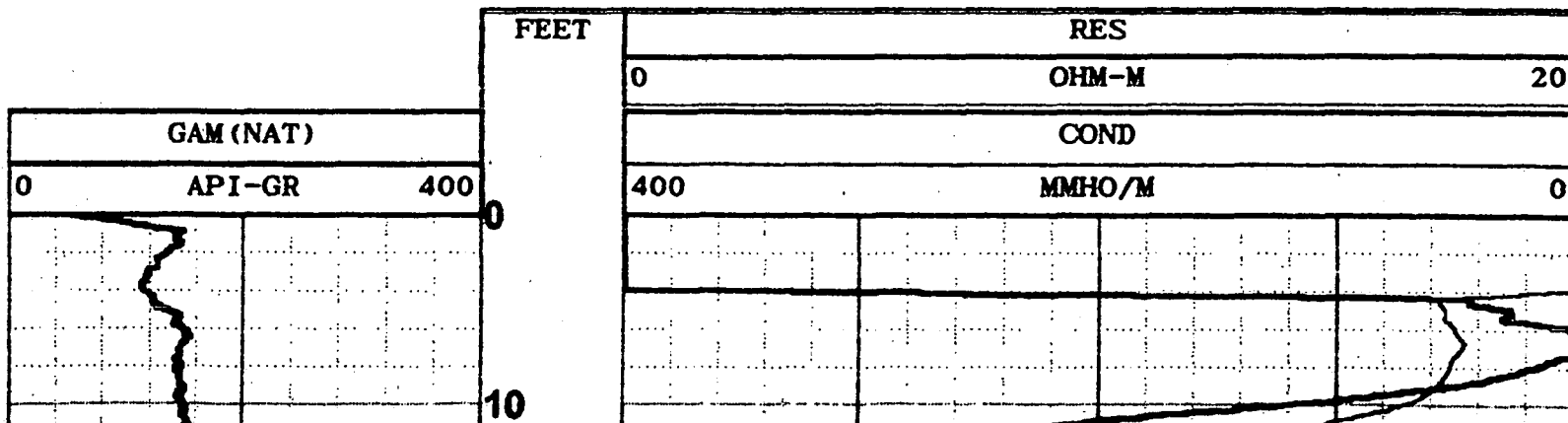


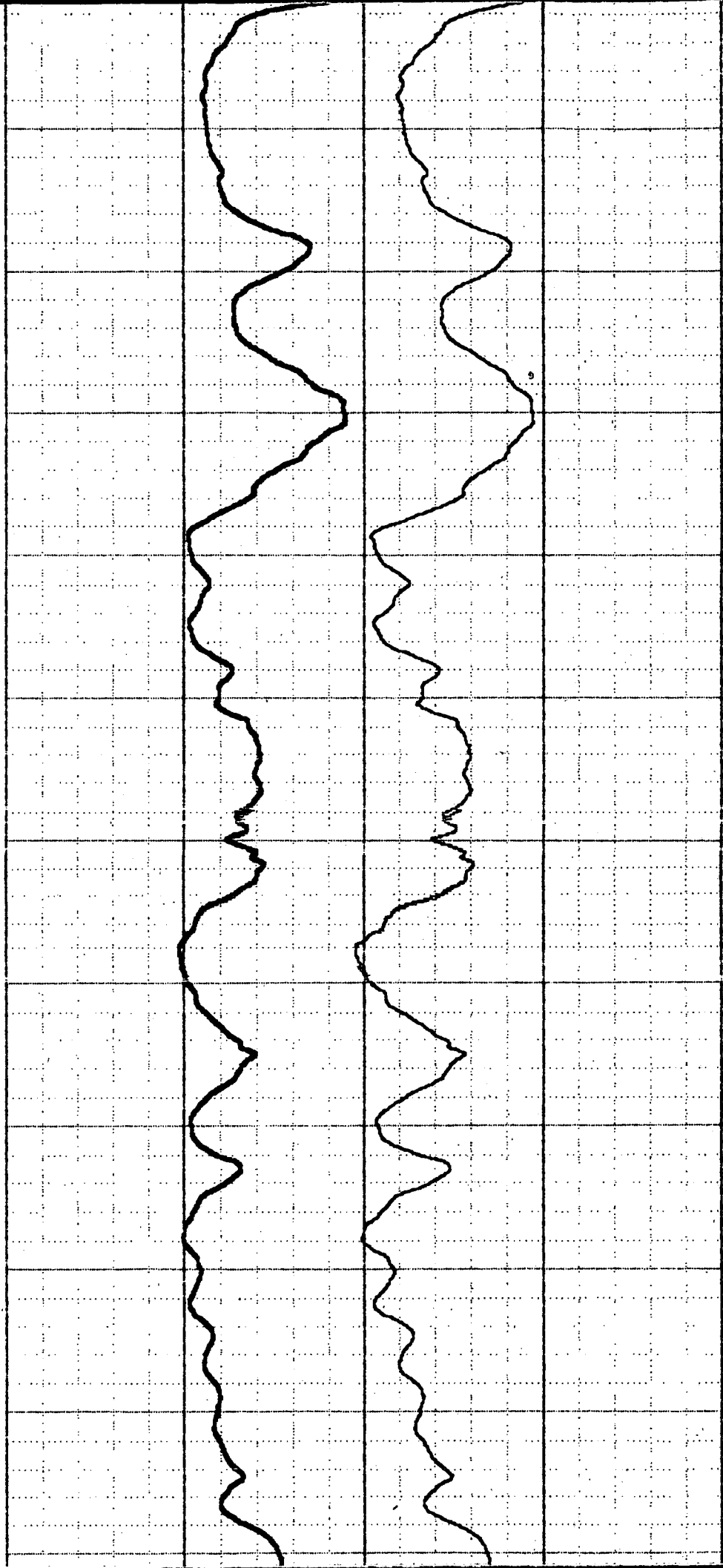
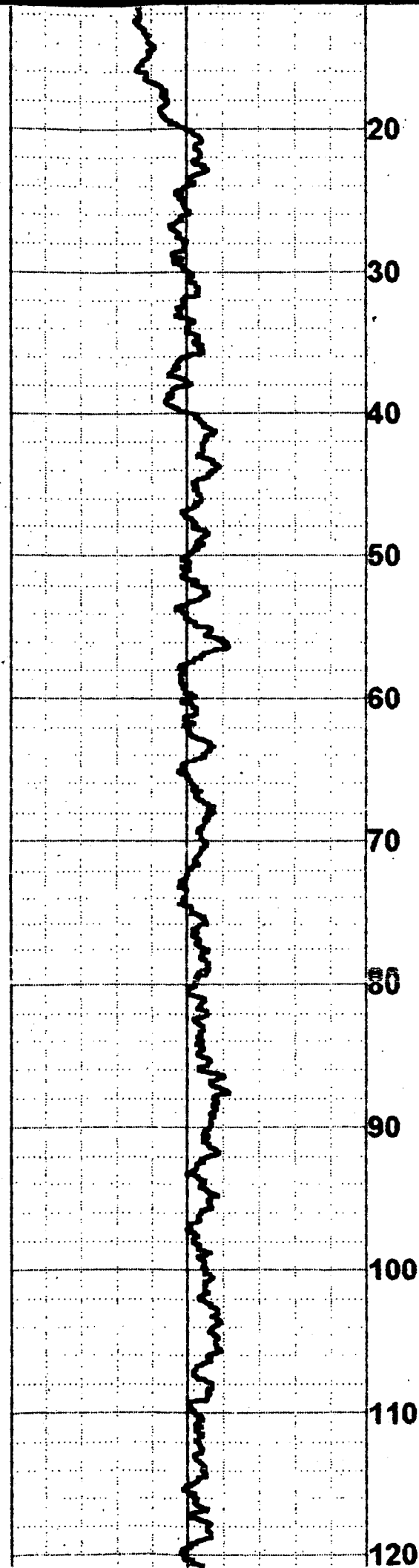


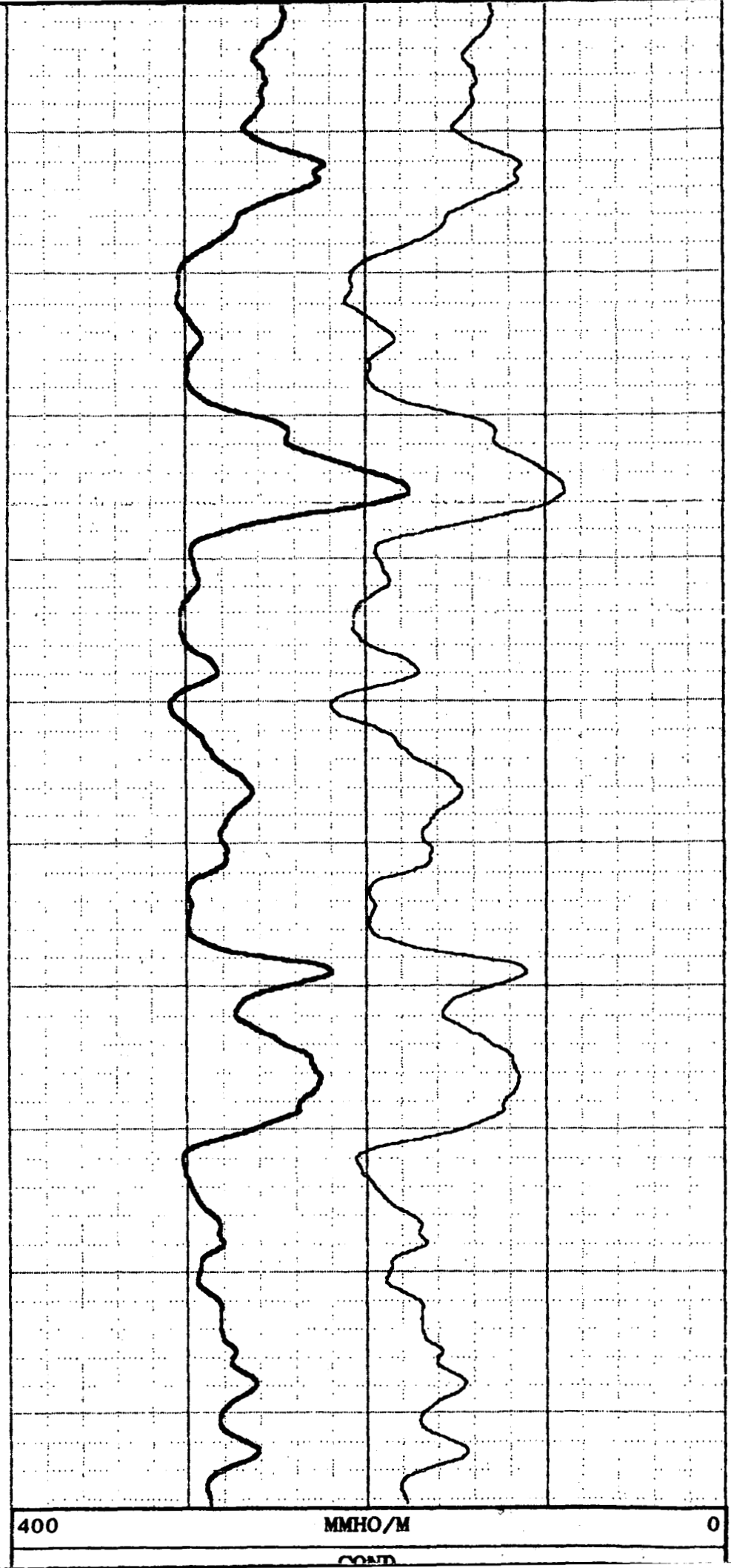
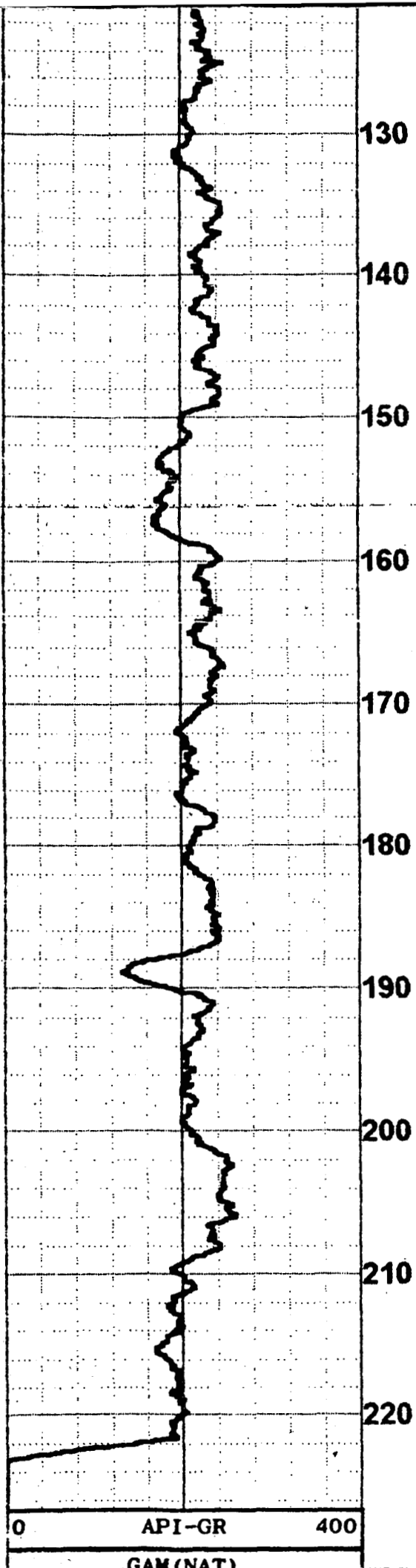


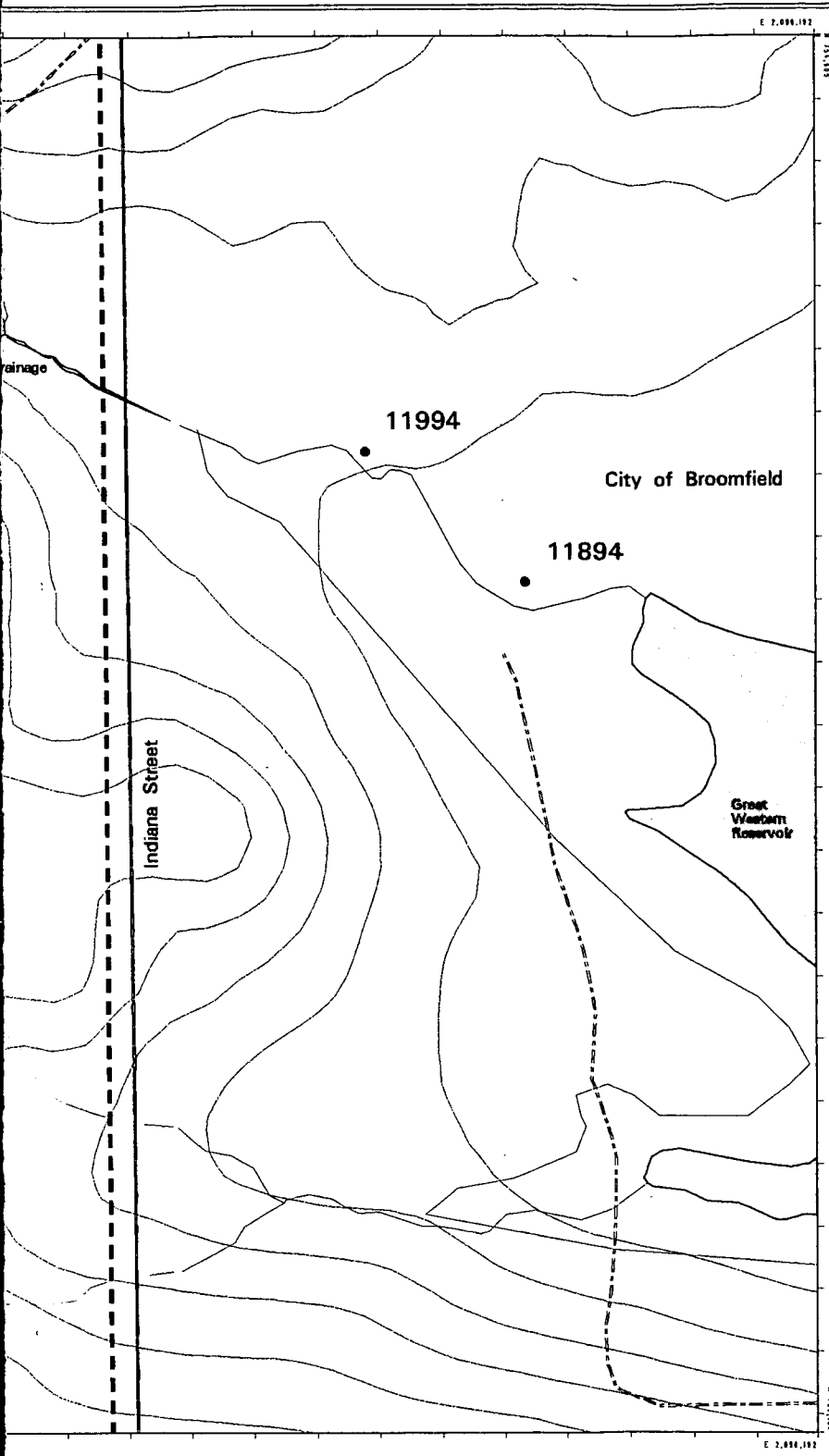
**69694**

**ALL SERVICES PROVIDED SUBJECT TO STANDARD TERMS AND CONDITIONS**







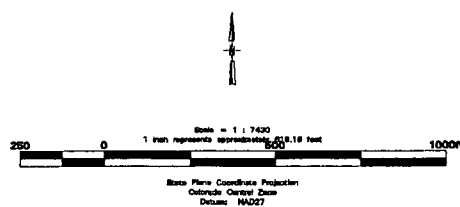


**FIGURE 2**  
**1994 Warp Groundwater Monitoring**  
**Well Location Map for the**  
**Eastern Site Boundary**

**EXPLANATION**

- New or Replacement Well
- Individual Hazardous Substance Sites
- Lakes and ponds
- Streams, ditches, or other drainage features
- Fences
- Contours (100' intervals)
- Rocky Flats boundary
- Heavy duty paved roads
- Medium duty paved roads
- Light duty paved roads
- Dirt roads

**DATA SOURCE:**  
 Individual Hazardous Substance Sites (IHSS's)  
 are determined by the following:  
 OU1 - RF/RI Phase III Report  
 OU2, 4, 7, 11, & 15 - HRR  
 The remaining OU's are defined by their  
 respective Operation Unit Workplan.  
 Buildings, roads, and fences provided by  
 Facilities Engineering,  
 EG&G Rocky Flats, Inc. - 1991  
 Hydrology provided by  
 USGS - (date unknown)



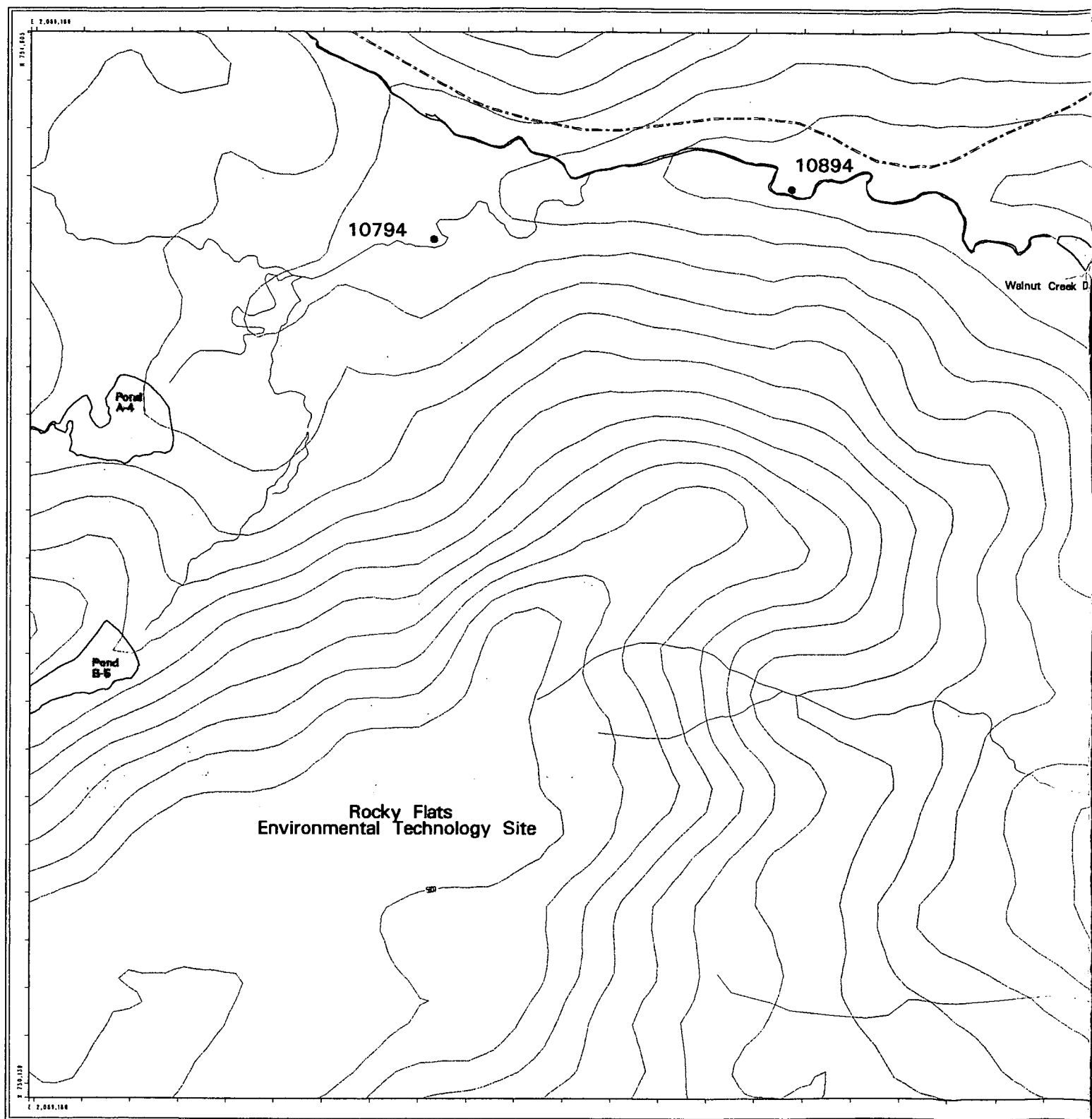
**U.S. Department of Energy**  
**Rocky Flats Environmental Technology Site**

Prepared by:  
**EG&G ROCKY FLATS**  
 Rocky Flats Environmental Technology Site  
 P.O. Box 464  
 Golden, Colorado 80402-0464

MAP ID: WARP

February 09, 1995

/home/s521905/projects/warp/warp-figa.m



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EXECUTIVE SUMMARY .....	ES-1
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## ACRONYMS AND ABBREVIATIONS

AAC	Additional Area of Concern
ACRP	Area Controlled for Radiological Purposes
ASTM	American Society for Testing and Materials
bgs	below ground surface
BH	prefix used to designate a borehole sample
BP	prefix used to designate annular abandonment samples
BZ	buffer zone
CCR	Code of Colorado Regulations
CFR	Code of Federal Regulations
DOE	U.S. Department of Energy
DNAPL	dense nonaqueous phase liquid
EMD	Environmental Management Division
EOM	Environmental Operations Management
EPA	Environmental Protection Agency
ERPD	Environmental Restoration Program Division
FID	flame ionization detector
FIDLER	Field Instrument for the Detection of Low-Energy Radiation
FOM	Field Operations Management
FSP	Field Sampling Plan
FT	foot or feet
FY	fiscal year
GMP	Groundwater Monitoring Program
HASP	Health and Safety Plan
HASPP	Health and Safety Program Plan
ID	inside diameter
IDM	investigative-derived material
IHSS	Individual Hazardous Substance Site
IN	inch or inches
LEL	Lower Explosive Limit
mil	a unit of measure equal to one-thousandth of an inch
NAD	North American Datum
NEPA	National Environmental Policy Act
OD	outside diameter
OP	operating procedure
OSHA	Occupational Safety and Health Administration
OU	Operable Unit
PA	Protected Area
PAC	Potential Area of Concern
PCB	polychlorinated biphenyl
PID	photoionization detector
POD	plan of the day
PPE	personal protective equipment
PRE	property release evaluation
PVC	polyvinyl chloride

## ACRONYMS AND ABBREVIATIONS (continued)

RADS	radionuclides
RCA	Radiation Controlled Area
RCRA	Resource Conservation and Recovery Act
RFEDS	Rocky Flats Environmental Data System
RFETS	Rocky Flats Environmental Technology Site
RFP	Rocky Flats Plant
RWP	Radiation Worker Permit
SEP	Systematic Evaluation Program
SVE	soil vapor extraction
SVOA	Semivolatile Organic Analysis
TAL	Target Analyte List
TCL	Target Compound List
TOC	top of casing
VOA	Volatile Organic Analysis
WARP	Well Abandonment and Replacement Program
°C	degrees Celsius

## **EXECUTIVE SUMMARY**

A Well Abandonment and Replacement Program has been initiated by the U.S. Department of Energy's Rocky Flats Environmental Technology Site.

The continuing purpose of the Well Abandonment and Replacement Program is to ensure that groundwater monitoring wells and piezometers are viable. Viable monitoring wells include those wells that have sufficient construction documentation, no damage, no obstructions, enough water for sample collection and analysis, and proper construction. Groundwater samples are considered representative or characteristic of subsurface conditions only when they are collected from viable wells. Monitoring wells that do not meet the standard of viability or are suspected of yielding non-representative data are either eliminated or replaced. In some cases, viable monitoring wells are removed because they are no longer needed for data.

This report documents the Well Abandonment and Replacement Program activities for 1994. The field activities included (1) abandonment of wells that are no longer necessary to the Groundwater Monitoring Program or are no longer viable, (2) installation of new or replacement wells, (3) drilling and evaluation of special boreholes for geotechnical or seismic investigations, (4) geophysical assessment including subsurface visual evaluation with borehole camera of select wells and boreholes, (5) land surveying of the locations of the above-mentioned wells and boreholes, and (6) installation of two offsite wells. Regulatory reporting requirements were complied with through well abandonment and installation reports. In this report, the terms well, monitoring well, and groundwater monitoring well are used interchangeably.

The following tasks were accomplished from May 2, 1994 to October 14, 1994:

- 19 wells installed (including two offsite);
- 39 wells abandoned;
- two boreholes abandoned;

- three wells repaired;
- 25 wells geophysically logged;
- 28 wells video surveyed;
- six special borings drilled and abandoned for seismic investigations;
- three special borings drilled and abandoned for geotechnical investigations; and
- three risers installed on existing wells.

## **1.0 INTRODUCTION**

This report describes and documents the tasks that were performed for the 1994 Well Abandonment and Replacement Program (WARP) at Rocky Flats Environmental Technology Site (RFETS), formerly Rocky Flats Plant (RFP). The 1994 WARP was completed under the direction of the Hydrogeologic Operations Department of EG&G Rocky Flats, Inc. Actual field work was completed by Jacobs Engineering Inc. under subcontract to EG&G Rocky Flats, Inc. Second-tier subcontractors included the following:

- Boyles Brothers - drilling;
- Century Geophysical Corp. - geophysical logging;
- Merrick Engineers and Architects - land surveying;
- Tierra Environmental - professional services; and
- Huntington Consulting Engineers and Environmental Scientists - geotechnical consulting.

In this report, the terms well, monitoring well, and groundwater monitoring well are used interchangeably.

### **1.1 SCOPE OF WORK**

The scope of work for the 1994 WARP included the following:

- abandonment of wells that are no longer necessary to the Groundwater Monitoring Program (GMP) or are no longer viable;
- installation of new or replacement wells;
- drilling and evaluation of special boreholes for geotechnical or seismic investigations;
- geophysical assessment including subsurface visual evaluation with borehole camera of select wells and boreholes;
- land surveying of the locations of the above-mentioned wells and boreholes; and
- installation of two offsite wells.

Thirty-nine wells were abandoned, three existing wells were repaired, 19 new wells were installed (including two offsite wells), two boreholes were drilled/abandoned, and three riser extensions were added to two existing groundwater monitoring wells and one methane vent. Twenty-eight selected wells and piezometers were video surveyed and geophysically assessed to determine their subsurface conditions. The information obtained will be evaluated for use in developing the 1995 WARP.

In addition, the 1994 WARP drilled, collected geotechnical samples, and abandoned three geotechnical boreholes. A geotechnical report was provided by a licensed geotechnical subcontractor. This work was performed in support of a sewer line installation project at RFETS. Also, six special boreholes (ranging from 170 feet to 240 feet) were drilled, geophysically logged, and abandoned to support a seismic hazard study as part of the Systematic Evaluation Program (SEP). The SEP is a program designed to evaluate the potential for the occurrence of natural phenomena that may pose a hazard to the site.

Finally, abandoned, newly installed, and geophysically assessed monitoring wells/piezometers, and special boreholes were land surveyed to determine their locations and elevations, according to Colorado true state plane coordinates.

## **1.2 BACKGROUND AND OBJECTIVES**

The WARP was initiated as a result of an internal environmental audit of the RFP facility performed by the U.S. Department of Energy (DOE) "Tiger Team" in 1989. This audit

identified the potential for improperly constructed or damaged wells and piezometers to serve as conduits for contaminant movement in the soil and/or groundwater. Proper abandonment of wells and piezometers was determined to be the first objective of the WARP plan of action for the protection of the environment.

A second objective of the WARP is for it to serve as a maintenance program for the GMP at RFETS. It has been used to identify monitoring wells that are no longer viable because of insufficient well construction documentation, well damage, casing obstruction, improper construction, or insufficient water to collect samples for chemical analyses.

As stated in the WARP Work Plan (EG&G 1994a), the specific objectives of the project are to meet the following goals:

- Properly abandon nonviable wells and piezometers using procedures that protect groundwater from contamination.
- Install new wells at locations where groundwater quality or potentiometric data are needed.
- Install replacement wells and piezometers at locations where a nonviable but useful well or piezometer is removed. A useful well is a well that is sited at a location and is monitoring a hydrostratigraphic unit where water quality and hydrologic data are needed.
- Assess historical wells of unknown construction using borehole geophysical techniques.
- Assess existing wells with questionable well construction conditions using a downhole video camera.



- Establish the locations and elevations of specified wells by land surveying.

After the DOE environmental audit in 1989, a WARP Program Plan (EG&G 1990) was prepared, and operating procedures (OPs) for the abandonment of groundwater monitoring wells and piezometers were developed. The WARP Program Plan detailed the goals and overall objectives of the WARP and defined the usefulness and viability criteria against which the wells and piezometers were to be evaluated. The wells will be periodically evaluated for damage, deterioration, and obsolescence. Wells that cannot be repaired or redeveloped will be appropriately abandoned and replaced if necessary.

A draft *Well Evaluation Report* (EG&G 1991a) was produced in which the 353 RFP monitoring wells and piezometers then in existence were evaluated against the WARP criteria. This evaluation was performed to identify potential wells and piezometers for abandonment. (The *Well Evaluation Report* was finalized in April 1994 [EG&G 1994b]).

The first implementation of field abandonment and replacement activities was conducted in 1992, the second in 1993, and the third in 1994.

The main regulatory driver of the WARP is the Resource Conservation and Recovery Act (RCRA), 40 Code of Federal Regulations (CFR) 265.91 (c), monitoring well construction standards. The implementation of the WARP serves to maintain compliance with DOE Order 5400.1 *General Environmental Protection Program* (DOE 1990). In addition, the WARP is performed in response to the DOE Tiger Team audit in 1989. The DOE recommendation was to eliminate wells with incomplete documentation, unused wells, and piezometers to prevent potential migration of subsurface water.

As a continuation of the WARP, wells fitting the above categories were abandoned, and specific wells that were identified as critical to the program were replaced. Other wells were installed as additions to the GMP.

### 1.3 WORK LOCATION AND SITE DESCRIPTION

Figure 1 presents the location of the wells situated within the perimeter of RFETS that are discussed in this report. RFETS covers 6,550 acres and is divided into three security zones. Major structures are located in the 400-acre plant security zone, which is an access-controlled area. Within this controlled area is the Protected Area (PA), which includes the most sensitive former production areas of RFETS. A 6,150-acre buffer zone surrounds the controlled area. Figure 2 shows the location of wells installed east of the RFETS boundary.

Of the 39 wells abandoned, 29 wells were located in the controlled area, 19 of which were within the PA, one of which was in an Area Controlled for Radiological Purposes (ACRP), also known as a Radiation Controlled Area (RCA). The remaining 10 wells were located in the buffer zone as well as two boreholes that were drilled and immediately abandoned. One piezometer was repaired in the PA, and two wells were repaired in the buffer zone. Two groundwater monitoring wells and one methane monitoring well (all located in the Present Landfill) had riser extensions added to them. Seventeen new wells were installed in the buffer zone, and two were installed offsite on the east side of Indiana Street. Three geotechnical boreholes were drilled, sampled, and abandoned in the Contractor's Yard. The six SEP special boreholes were drilled and abandoned in the buffer zone, approximately 800 feet northeast of the Present Landfill.

Some of the WARP wells are or were located in areas of potential or known soil and/or groundwater contamination. This information was taken into consideration during the field effort. The WARP Health and Safety Plan (HASP) was written to address site-specific conditions and to specify the required field monitoring and personal protective equipment (PPE). Soil disturbance permits were obtained according to established procedures for locations where intrusive work was to be performed. Radiation Worker Permits (RWP) were obtained as required. Preevolution (pre-field activities) meetings were held at new work locations, and daily work activity briefings were held along with tailgate safety briefings.

#### **1.4 TECHNICAL REQUIREMENTS**

As stated, the main regulatory driver of the WARP is the RCRA, monitoring well construction standards. In addition, monitoring wells were installed in accordance with Colorado state well construction standards, and Colorado state water well installation and abandonment permits were completed and submitted. Well abandonment and installation reporting requirements are discussed in Section 9.0. Appropriate American Society for Testing and Materials (ASTM) methods and/or certified materials were used throughout the project. Detailed documentation can be found in individual well files, on the OPs field forms, in the Rocky Flats Environmental Data System (RFEDS), and in the field logbooks. Subsurface video recordings (cassettes) were retained by Rocky Flats personnel.

## **2.0 WELL ABANDONMENT**

Thirty-nine wells were abandoned as part of the 1994 WARP in accordance with OP GT.11, *Plugging and Abandonment of Wells*, Environmental Management Division (EMD) Operating Procedures, Manual No. 5-21000-OPS-GT, Volume III: Geotechnical (EG&G 1992a). GT.11 identifies the following general objectives for well abandonment:

- prevention of groundwater and soil contamination through the well;
- prevention of intermixing of groundwater in different hydrostratigraphic units;
- conservation of hydraulic characteristics of individual hydrostratigraphic units; and
- minimization of physical hazards.

GT.11 also provides instructions for well abandonment activities.

### **2.1 PREABANDONMENT ACTIVITIES**

Before beginning WARP abandonment activities, State of Colorado Well Abandonment reports were completed for each well and were submitted as each well was abandoned. Copies of the applications were retained in the 1994 WARP well files.

Permission to access and work inside the PA, around specific buildings, and in the 800 area was obtained. Work was scheduled during building and/or area plan-of-the-day (POD) meetings before work was begun.

Field activity coordination meetings were conducted at each type of location or sensitive area before abandonment activities were begun. Site-specific items were discussed including safety, RWPs, utility clearances, building requirements, and required signs. Tailgate safety meetings and work activity meetings were held daily. The sign-off sheets documenting these meetings are included in the individual well files.

Work areas were monitored in accordance with OP FO.16, *Field Radiological Measurements*, EMD Operating Procedures, Manual No. 5-21000-OPS-FO, Volume I: Field Operations (EG&G 1992b), to indicate whether surficial radioactivity existed in the immediate work area. Monitoring was accomplished by making direct soil surface measurements with a Bicron Analyst Field Instrument for the Detection of Low-Energy Radiation (FIDLER). A grid of 17 points was surveyed at each site. Three of the well site locations had elevated readings on the FIDLER above background levels for radioactivity (Operable Unit [OU] 2 soil vapor extraction [SVE] wells 24193, 24393, and 25093). The elevated FIDLER readings were detected on the cement surface well pads.

When possible, before abandonment, the groundwater level and total depth of each well were measured. The volume of liquid contained within the well was calculated to allow for the design of a waste containment structure sufficiently large to contain well water displaced during grouting. Several of the wells required a small containment structure constructed with sand bags and a plastic liner. Liquid displaced from the wells was contained in buckets as it flowed out of the augers. The bermed area was used to contain any potential spills. The collected liquid was then placed in a container and transported to the decontamination facility for disposal. A record of the disposed liquid was entered into the log at the decontamination facility.

## 2.2 ABANDONMENT METHODS

The first step of well abandonment is to destroy and remove the surface pads and protective casings. Surface concrete well pads and protective casings were removed from each site as specified in OP GT.11, *Plugging and Abandonment of Wells* (EG&G 1992a). The handling of the resulting waste is discussed in Section 2.7 of this report. Because elevated FIDLER readings were detected on the surface pads at wells 24193, 24393, and 25093, the crew was dressed in Level C PPE while the surface pads were removed. Additional surveys were made of the pads that showed no elevated readings; therefore, it was surmised that the original readings may have actually come from subsurface contamination. Additional field monitoring and personnel breathing zone monitoring during the abandonment of these wells

did not indicate radiological contamination above background levels. The well construction material that was brought to the surface during the well abandonment was field monitored for radioactive and chemical contamination, and none was detected.

OP GT.11, *Plugging and Abandonment of Wells*, (EG&G 1992a) identifies the following five methods for well abandonment at RFETS:

- casing pulling;
- casing destruction (i.e., drilling out casing);
- overdrilling;
- overcoring; and
- abandonment in place (i.e., without casing removal).

Well abandonment data are summarized in Table 1.

### **2.2.1 Casing Pulling**

The Work Plan (EG&G 1994a) specified that four wells should be abandoned by pulling the casing; however, these wells were abandoned in place without casing removal because of field conditions. Wells 0154, 0254, and 0354 were constructed from galvanized, perforated 12-inch steel casing and were located on hillsides, making them difficult to access with the drill rig. Because of the large diameter of these casings, they could not be pulled or overdrilled. In addition, well 0154 was located in an ACRP, which created additional logistical problems for equipment and personnel. Because well 5670 was located close to Building 776 with an overhang and aboveground utility wires, the drill rig could not be positioned over the well to perform the abandonment.

### **2.2.2 Casing Destruction**

Four wells were abandoned by casing destruction. This method involves using a hollow-stem auger drilling rig to drill out both casing and annular completion materials. Three of four

wells abandoned by the casing destruction method (5070, 5570, and 6874) were constructed with polyvinyl chloride (PVC) casing.

Typically, casing destruction is only performed on wells with PVC casing. However, well 4986, constructed with stainless-steel casing, was abandoned by this method because the inner steel casing was broken off below ground surface (bgs) during the surface pad and protective casing removal, and the attempt to overdrill had failed. The auger hit the top of the casing rather than fitting around it, causing the casing to be destroyed as the augers were advanced. Stainless-steel cuttings and annular material were brought to the surface throughout the abandonment procedure. A downhole detonation occurred at 58 feet, and field monitoring instruments (MSA® Passport—an oxygen, carbon monoxide, hydrogen sulfide, and Lower Explosive Limit [LEL] meter - calibrated to methane) detected hydrogen sulfide, methane, and carbon monoxide gases inside the well borehole. The LEL meter's readings ranged from 12-20 percent for methane, which indicated an explosive atmosphere. The presence of carbon monoxide (a by-product of combustion) indicated an explosion had occurred. Gas samples were collected from the borehole and were submitted to an onsite analytical laboratory. The results were inconclusive. The gas inside the borehole was displaced by pumping argon gas into the borehole. Continuous field monitoring was conducted. When it was determined that conditions were safe to continue work, grout was tremmied into the borehole, and abandonment was completed according to GT. 11, *Plugging and Abandonment of Wells*, (EG&G 1992a). Well 4986 was abandoned with 11 feet of casing left in place (58 to 69 feet bgs), and the remainder was removed by destructive drilling.

### 2.2.3 Overdrilling

The overdrilling method used hollow-stem augers to drill around the well casing. After the augers have drilled around the casing to the total depth of the original borehole, the casing is pulled with the augers in place. The hole is then reamed to remove the annular materials. Four SVE wells (24093, 24193, 24393, and 25093) were abandoned by overdrilling. The casing and well construction materials were radiologically surveyed and field monitored as

they were removed from the borehole. As stated in Section 2.2, no contamination above background levels was detected. The casings and concrete pads were handled as described in Section 2.7 of this report.

#### **2.2.4 Overcoring**

Overcoring is similar to overdrilling except that a coring tool is used to remove annular material from around the casing. It is typically used in deep wells or where the casing is embedded in consolidated rock. This method was listed as an option to overdrilling in the WARP Work Plan (EG&G 1994a); however, overcoring was not required during the fiscal year (FY) 94 WARP.

#### **2.2.5 Abandonment in Place**

The WARP Work Plan (EG&G 1994a) states that wells that do not penetrate a confined hydrostratigraphic unit may be abandoned with the casing left in place. Thirty-one wells were abandoned in place. Because of drill rig access problems, a field decision was made to abandon in place selected wells that were proposed for abandonment by other methods. Table 1 lists the abandonment method for each well.

For dry wells, abandonment in place was accomplished in accordance with GT.11, *Plugging and Abandonment of Wells*, (EG&G 1992a) by the following steps:

1. The wells were filled with bentonite grout to within 3 feet of ground surface and allowed to set for 24 hours.
2. Bentonite chips or pellets were placed to ground surface or top of casing.
3. A permanent watertight cover was placed on the casing at ground level.
4. A surface protective concrete slab or plug was installed.



5. A metal monument was placed in the center of the slab or plug and the location code (well number) was inscribed in the concrete of the well pad.

Abandonment in place for wells containing water was performed in accordance with GT.11 (EG&G 1992a) and consisted of the following steps:

1. In an unconfined well the casing was filled with sand to the static water level. In a confined well with known well construction, the casing was filled to the level of the top of sand.
2. Bentonite grout was placed to ground surface.
3. A permanent watertight cover was placed on top of the casing.
4. A surface protective concrete slab or plug was installed.
5. A metal monument was placed in the center of the slab or plug and the location code (well number) was inscribed in the concrete of the well pad.

Well 0166 had previously been improperly plugged. The well was not grouted to surface, was filled with trash and concrete blocks, and did not have any surface protection. During the 1994 WARP, this well abandonment was completed properly and an aboveground surface pad and monument were installed.

### 2.3 GROUTING

The abandoned wells, other than those abandoned in place, were grouted in accordance with OP GT.05, *Plugging and Abandonment of Boreholes* (EG&G 1992a). Pure Gold® bentonite grout was mixed in a mechanical grout mixer, checked for proper density (greater than or equal to 9.9 pounds per gallon) using a mud balance, and pumped into the abandoned boreholes through either a tremmie pipe or drill rod.

The bentonite grout was allowed to set for a minimum of 24 hours and was removed to a depth of between 2 to 3 feet, if necessary to allow emplacement of the concrete surface plug.

## **2.4 SURFACE PROTECTION**

A concrete plug was placed from the top of the grout to the ground surface for abandonments that required a flush-mounted surface completion. Surface pads were constructed over abandoned wells that were located in the buffer zone or areas where car and foot traffic were infrequent. The pads were 3 feet by 3 feet by 6 inches thick and were constructed at ground surface. The concrete surface pads were inscribed with the corresponding well numbers, and metal monuments were placed in the center of the concrete surface pads or flush-mounted plugs. The metal monuments were stamped with the corresponding well numbers.

## **2.5 BOREHOLE ABANDONMENT**

Two boreholes that were intended to be completed as monitoring wells were abandoned at well locations prior to casing installation. In the first borehole (10494), a specialized surface casing (discussed in Section 3.3.2) was installed. While drilling the borehole through this specialized casing, at a depth of 10.40 feet bgs, the surface casing and pad were lifted and moved. Thus, the integrity of the surface seal was compromised. Therefore, the surface casing and pad were removed, and the remaining borehole was abandoned according to OP GT.05, *Plugging and Abandonment of Boreholes* (EG&G 1992a). An offset replacement well 12094 was drilled to replace the abandoned borehole.

The second borehole (11194) was abandoned because after the surface casing and pad were installed and the borehole had been drilled, it was found that the proposed total depth was in bedrock. Because this was intended to be an alluvial well, and the well was dry, the borehole was abandoned and relocated. The surface casing and pad were removed, and the remaining borehole was abandoned. The replacement is well 10094.

## 2.6 REPAIRS

One piezometer located in the PA (42893) and two groundwater monitoring wells located in the north buffer zone (4087 and 6687) were slated for abandonment in the WARP Work Plan (EG&G 1994a). However, upon examination, it was determined that these wells could be repaired and remain in the GMP. Therefore, a new surface pad and protective casing were installed at piezometer 42893, the freeze damage to the casing of well 4087 was repaired by replacing a short section of casing, and a new surface pad and protective posts were installed for well 6687. The summary of information for these wells is given in Table 1.

## 2.7 WASTE HANDLING FOR ABANDONED WELLS

The environmental materials generated from the WARP activities were handled in accordance with OP FO.10, *Receiving, Labeling, and Handling Environmental Materials Containers* (EG&G 1992b).

The following materials were removed from the WARP wells as part of the well abandonment process:

- broken concrete surface pads;
- steel protective casings;
- PVC or steel riser and screen; and
- annular well material (e.g., sand pack, grout, destroyed well casings).

Broken concrete surface pads were field screened (smeared/frisked for radioactive contamination and monitored for volatile organics), wrapped in plastic, labeled with well numbers, and transported to a storage area in the Contractor's Yard. Casings were field-screened, cut into 2-foot sections, decontaminated, wrapped in plastic, labeled with the well number, and transported to a storage area in the Contractor's Yard.

### 2.7.1 Drummed Material from Abandoned Wells

The annular well material that was removed from each well was field-screened as described in the last paragraph, placed in drums, and sampled. WARP wells were located in different OUs throughout Rocky Flats. Each OU has different sampling requirements and data quality objectives that are outlined in an individual Field Sampling Plan (FSP). Data for waste characterization, subsurface geologic characterization, and hydrologic aquifer characterization were obtained depending on the needs of the individual OU. Table 2 is a compilation of the applicable individual FSPs that include the analytical sampling requirements as well as the sampling intervals.

Composite samples (BP, a prefix used to designate annular abandonment material samples) were collected from every four drums that were filled at each site in accordance with GT.02, *Drilling and Sampling using Hollow-stem Auger Techniques* (EG&G 1992a). Chain-of-custody forms were completed for samples that were submitted to offsite laboratories. The requested analyses are shown in Table 2. Field forms were completed for each composite sample to document the required analyses, field screening, and associated drum numbers. Sample information and the analytical results are stored in the Rocky Flats Environmental Data System (RFEDS). In addition, the *Well Abandonment and Replacement Program Geochemical Characterization 1992-1994, Draft*, report (EG&G 1995) presents analytical results from the 1992, 1993, and 1994 WARPs.

In most cases, the drums were transported to temporary storage facilities the day they were filled. One drum inspection was performed for each site to confirm that the drums had been removed. This information was documented on the drum inspection forms included in the well files. The drums are currently stored in RFETS storage facilities awaiting ultimate disposition.

Drill cuttings were field-screened using an organic vapor monitor and a radiation detector according to FO.15, *Photoionization Detectors (PIDs) and Flame Ionization Detectors*

(FIDs), and FO.16, *Field Radiological Measurements* (EG&G 1992b). Field screening data are documented on the appropriate field forms and are stored in the individual well files.

The waste characterization determinations for the WARP sites were made and are documented in Appendix A.

The 30-gallon gray drums were lined with two 3-mil (thousandth of an inch) plastic square-bottomed bags. RADSORB® desiccant was added to the drill cuttings as they were placed in the drums. The plastic bags were sealed with duct tape and labeled. The drums were closed, labeled with paint pens, and custody seals were installed.

Hazardous waste drum labels were completed and affixed to the drums by a trained and certified Waste Generator. Drum/waste travelers were completed, signed by the Waste Generator and the Waste Management Supervisor, and the custody of the drums was transferred to the operators of RFETS. Drum characterization information for environmental material generated during the well abandonments can be found in Table 3. The WARP project generated 128 30-gallon gray drums.

#### **2.7.2 Personal Protective Equipment and Field Trash**

PPE and field trash were collected in 3-mil clear plastic bags at each field location. The material was monitored for volatile organics and radionuclides. The results were documented on chain-of-custody forms and labels that were applied to the plastic bags. The PPE and field trash were transferred to the operators of RFETS under chain-of-custody in accordance with OP FO.6, *Handling of Personal Protective Equipment* (EG&G 1992b).

### **2.8 HEAVY EQUIPMENT AND GENERAL DECONTAMINATION**

Field equipment was decontaminated in accordance with OP FO.3, *General Equipment Decontamination*, or OP FO.4, *Heavy Equipment Decontamination* (EG&G 1992b). Downhole equipment was decontaminated before it was used, between uses, and after its

final use (before it was released from the site). The drill rigs, grout mixers, support vehicles, and other heavy equipment were decontaminated before use, before and after working within Individual Hazardous Substance Sites (IHSSs), before and after use within the PA, and before obtaining property release evaluations (PREs) to remove the equipment from RFETS.

General small equipment was decontaminated in the field using tubs, garden sprayers, Liquinox, and deionized water. Decontamination liquid was collected in containers and transported to the decontamination facility for disposal. Heavy equipment decontamination was performed at the main decontamination facility in the RFETS Contractor's Yard. Equipment used inside the PA was decontaminated at the PA Decontamination Facility before it was removed from that area.

Equipment received a PRE that stated screening and field-monitoring requirements in accordance with OP FO.16, *Field Radiological Measurements* (EG&G 1992b) and Environmental Management Radiological Guidelines (EMRG) 3.02 (4-B96-ER-OPS-EMRG-03.02), *Survey Requirements for Conditional and Unrestricted Use* (EG&G 1991b), Environmental Management Radiological Guidelines, Manual No. 3-21000-OPS-EMRG, before it was removed offsite.

### 3.0 WELL INSTALLATION

Nineteen wells were installed as part of the FY94 WARP. The wells were installed as new wells to (1) serve as additions or replacements to the GMP, (2) evaluate well construction design (Section 3.3.4), or (3) provide monitoring data in support of select OUs. Refer to Table 4 for well installation summary information.

#### 3.1 PREDRILLING ACTIVITIES

Before the project fieldwork was allowed to begin, a readiness review was completed. Soil disturbance permits for each new monitoring well site were obtained.

Borehole clearances and utility surveys were completed at each site. A work activity meeting was held with the field personnel who would be working on the well installations to inform them of any safety hazards that might be present. These meetings are documented in the well files.

Biological surveys were conducted at each new well location to comply with the following regulations:

Federal Regulations	Migratory Bird Treaty Act Endangered Species Act Clean Water Act - Wetlands National Environmental Policy Act (NEPA)
Colorado Regulations	Threatened Endangered and Nongame Species Act

The onsite surveys consisted of taking a walking sweep of the areas and then flagging areas of ingress and egress to prevent unnecessary disturbance of the biota. The presence or absence of the species of concern was documented and, in some cases, work was delayed as a result of the presence of migratory birds in the proximity of a well site.

Preactivity surveys were conducted using a Bicron Analyst FIDLER at the new well locations. Radiation levels elevated above background were not detected by FIDLER measurements at any of these locations. The drill rigs and equipment passed Occupational Safety and Health Administration (OSHA) inspections. State of Colorado Well Installation permit applications were completed for each of the proposed wells and submitted, which is documented on the well installation field forms.

### 3.2 DRILLING METHODS

The FY94 WARP wells were drilled in accordance with GT.01, *Logging Alluvial and Bedrock Material*, GT.02, *Drilling and Sampling Using Hollow-stem Auger Techniques*, GT.03, *Isolating Bedrock from Alluvium with Grouted Surface Casing*, and GT.04, *Rotary Drilling and Rock Coring* (EG&G 1992a).

Fifteen boreholes were drilled using a Mobile B-57 hollow-stem auger drilling rig. Wells 11294, 11394, 11494, and 11594 were drilled using a Mobile B-57 drilling rig equipped with an ODEX® air rotary percussion hammer drilling system.

The 19 groundwater monitoring wells were installed in accordance with GT.06, *Monitoring Well and Piezometer Installation* (EG&G 1992a). Boreholes that were drilled to 30 feet or less were drilled with a 4-1/4-inch inside diameter (ID) hollow-stem auger. Those that were deeper than 30 feet were drilled using an 8-1/4-inch ID hollow-stem auger.

The monitoring wells were constructed with 2-inch diameter, PVC casing. A 2-foot sump with a threaded end cap was placed in the bottom of each well. All of the monitoring wells, except the two test wells, were completed using 16/40 silica sand as the filter pack material. A bentonite seal was installed above the filter pack in each well. Bentonite grout was mixed in a mechanical grout mixer and placed in the borehole with a tremmie pipe. The grout density was confirmed to be greater than or equal to 9.9 pounds per gallon with the use of a mud balance.



- A 12-inch diameter, Schedule 80 PVC surface casing or a 16-inch diameter steel surface casing was installed by drilling a 16- to 20-inch diameter borehole with a 12-inch ID hollow-stem auger. The borehole was enlarged as necessary with a pick and shovel. All soil cuttings were carefully removed and placed in separate drums at each well site.
- The surface casings were installed in accordance with GT.03, *Isolating Bedrock from Alluvium with Grouted Surface Casing* (EG&G 1992a), using concrete instead of bentonite grout. The PVC casings had been wire wrapped, and the steel casings had been rebar welded to the outside to create more surface area for the adherence of concrete. The casings were placed in the boreholes to a depth of 2 feet, with a 6-inch stickup, to prevent potentially contaminated surface soil from entering the borehole.
- A concrete surface pad, 3-feet long by 3-feet wide by 6-inches high, was placed around each specialized surface casing. The well number was inscribed in the concrete surface pad of each well.
- Soil from the bottom of the surface casing (2 feet bgs) was collected as a surface casing sample and analyzed for selected radionuclides.
- Locking well caps were placed on the 12-inch diameter PVC casings, pending analytical results from the surface casing sample. Locking caps with a 16-inch diameter were not available; therefore, clear plastic was placed on the top of the casing, which was then sealed with duct tape. Custody seals were placed on the plastic covers to detect tampering.
- Upon confirmation that cross-contamination did not occur, drilling activities resumed and were performed in accordance with GT.02, *Drilling and Sampling Using Hollow-stem Auger Techniques* (EG&G 1992a).

### 3.2.1 Standard Wells

Wells 10994 and 11094 were drilled in accordance with OPs GT.02, *Drilling and Sampling Using Hollow-stem Auger Techniques* (EG&G 1992a). Analytical samples were collected following the OU5 Field Sampling Plan (DOE 1991a). The boreholes were continuously cored. The wells were constructed with a single casing in accordance with GT.06, *Monitoring Well and Piezometer Installation* (EG&G 1992a). Figure 3 is a schematic diagram of a standard monitoring well completion.

### 3.2.2 Wells Constructed with Specialized Surface Casing

Surface contamination is widespread east of the Industrial Area of RFETS as a result of wind dispersal of soil containing certain radiological constituents, including plutonium and americium. Specialized surface casing was designed and aseptic drilling techniques were used to prevent potential surface-soil contamination from being carried down the borehole. Nine of the monitoring wells installed on RFETS property were constructed with double casing (a separate specialized surface casing/sanitary seal) as specified in GT.03, *Isolating Bedrock from Alluvium with Grouted Surface Casing* (EG&G 1992a). The monitoring wells, on RFETS property, that had a specialized surface casing installed before they were drilled are wells 10094, 10194, 10294, 10394, 10594, 10694, 10794, 10894, and 12094. Two additional monitoring wells were installed east of Indiana Street (discussed in Section 3.3.3) using aseptic drilling techniques. These wells were installed in response to recommendations of the *Well Evaluation Report* (EG&G 1994b).

To determine and/or prevent cross-contamination while these wells were being drilled or constructed, the following procedures were followed:

- A surface soil sample was collected in accordance with GT.08, *Surface Soil Sampling*, (Modified 5-point RFP Method) (EG&G 1992a) and analyzed for selected radionuclides.

- The boreholes were continuously cored and analytical samples were collected in accordance with the field sampling plan for the OU in which the well was located (Table 2).

Figure 4 presents a schematic diagram illustrating the phases of the installation of the specialized surface casings.

### 3.2.3 Offsite Wells

Two groundwater monitoring wells were installed on the east side of Indiana Street (in the Walnut Creek drainage on City of Broomfield property). These wells were drilled for the reasons described in Section 3.3.2.

Wells 11894 and 11994 were installed and constructed in the same manner as the wells with specialized surface casings described above. Figure 2 is an offsite location map for these two wells. These wells are constructed as shown in Figure 3. The specialized surface casings were installed as shown in Figure 4.

### 3.2.4 Test Wells

Two alluvial monitoring wells (11694 and 11794) were located adjacent to an existing well (B200889) in the north buffer zone. These wells were installed to evaluate the effectiveness of the screen slot size and filter pack design to reduce turbidity during groundwater sampling.

These wells were constructed with 2-inch nominal ID, Schedule 40, PVC casing in accordance with GT.06, *Monitoring Well and Piezometer Installation* (EG&G 1992a). The well construction deviated from GT.06 in the following ways:

- Well 11694 was constructed with a 2-inch and 4-inch diameter dual wall, 0.008-inch slot size well screen with 40/60 mesh inner and 16/40 mesh outer sand filter packs.
- Well 11794 was constructed with a single 2-inch inside diameter, 0.006-inch slot well screen and 30/70 mesh sand filter pack.

The wells were continuously cored. Soil/drill cuttings from these wells were handled in accordance with FO.23, *Management of Soil and Sediment Investigative-Derived Materials (IDM)* (EG&G 1992b). This procedure was followed because the wells were not located in an IHSS, Potential Area of Concern (PAC), Additional Area of Concern (AAC), or OU, and because historical well data from other wells in the area did not indicate any contamination.

During the drilling of the wells, the cuttings were placed on bermed plastic, and they were covered during nonworking hours. PREs were obtained for the soil; proper contaminant screenings were completed; and the material was transported and disposed in the Present Landfill at RFETS.

An evaluation of the effectiveness of the varying screen slot sizes is not currently available. The GMP at RFETS will evaluate these wells during ongoing well sampling events.

### 3.2.5 ODEX® (Air Percussion) Wells

The ODEX® air percussion drilling method was used to drill and install groundwater monitoring wells 11294, 11394, 11494, and 11594.

The ODEX® method is an air rotary, continuous casing advance system using a downhole percussion hammer. The hammer bit is used in conjunction with a reamer bit that enlarges the borehole enough to allow the casing to follow the hammer downhole. The casing used was 6-inch outside diameter (OD) threaded steel in 5-foot sections. The circulation medium for the system is compressed air that is injected down the drill rods and circulated up the

annulus between the steel casing and the drill rods, returning the drill cuttings to the surface. A Mobile B-57 tandem drilling rig was used.

Soil and drill cuttings from these wells were handled as described in Section 3.2.4.

During the drilling of the wells, the cuttings were placed on bermed plastic and covered during nonworking hours. PREs were obtained for the soil; proper contaminant screenings were completed; and the Construction Management Department coordinated the pickup, transport, and disposal of the IDM in the present landfill at RFETS.

### 3.3 SURFACE COMPLETIONS

The surface completions for the standard wells were installed in accordance with GT.06, *Monitoring and Piezometer Installation* (EG&G 1992a). Figure 5 is a schematic diagram of surface completion.

The surface completion for the wells constructed with specialized surface casings was modified to accommodate the large-diameter surface casings. The 5-foot long, 8-inch diameter protective casing was placed inside of the 12- or 16-inch diameter surface casing to a depth of 2 feet bgs. Concrete was placed in the annulus between the protective casing and the specialized surface casing. The existing pad with the well number inscribed in it was left in place around the well.

### 3.4 SOIL SAMPLING

The field sampling for WARP was designed to meet the requirements of RCRA Facility Investigation/Remedial Investigation sampling, and the individual FSPs from the affected OUs (OU5, [DOE 1991a], OU6 [DOE 1991b], OU7 [DOE 1992], and OU11 [DOE 1994]). The FSPs indicated analytes of concern and sampling intervals. Table 2 is the WARP Sampling Matrix. Because of economic constraints, WARP provided limited support for OU11. No analytical samples were collected for wells 11294, 11394, 11494, or 11594.

Borehole (BH, used to designate samples taken from the borehole) samples were collected and handled in accordance with FO.13, *Containerization, Preserving, Handling, and Shipping of Soil and Water Samples* (EG&G 1992b). Soil samples were collected using a standard split-spoon sampler with a moss wireline system.

Samples were submitted for analysis of Target Compound List-Volatile Organic Analysis (TCL-VOA), Target Compound List-Semivolatile Organic Analysis (TCL-SVOA), Target Analyte List (TAL) metals, and radionuclides. In addition, well 5771 was analyzed for polychlorinated biphenyls (PCBs) and plutonium.

Sample numbers and location codes for WARP were assigned by the EG&G Sample Management/Control Department. Samples with the BH prefix designate in situ borehole material. Samples with BP prefix designate annular and well construction materials extracted from existing wells/piezometers. Duplicate radionuclide screen samples were sent to Roy F. Weston Laboratories in Lionville, Pennsylvania, and International Technology's, St. Louis, Missouri, laboratories. TCL-VOAs and TAL metals were sent for analysis to Roy F. Weston's-Gulf Coast, Illinois, laboratory. SVOAs were sent to International Technology—St. Louis, Missouri, and detailed radionuclide analyses were performed by either Sciencetech, Texas; TMA-Norcal, California; or International Technology—Richland, Washington, laboratories. (Note: International Technology laboratories became Quanterra Laboratories as of July 1994.) Analytical results from the laboratories were reported directly to RFEDS.

VOA samples were collected in stainless-steel cylindrical sleeves in the downhole end of the core barrel. The sleeves were immediately covered with Teflon® swatches, capped with plastic endcaps, sealed inside a plastic bag, and placed in a cooler containing blue ice. A radionuclide screen was collected for each VOA sample in accordance with FO.18, *Environmental Sample Radioactivity Content Screening* (EG&G 1992b).

Radionuclides and TAL metal samples were collected as composites from the central portion of the core. A radionuclide screen sample was collected for each composite sample. VOAs, SVOAs, and metals were maintained at 4 degrees Celsius (°C).

Quality Assurance/Certificates of Analysis were obtained from the bottle manufacturers to document that clean and contaminant-free sample bottles were used throughout the project.

### 3.5 GEOLOGIC CORE LOGGING

Preliminary lithologic logging was performed at the time of core recovery by the site geologist. A field borehole log was completed at that time. The core was then wrapped in plastic, boxed, and transported to a core-logging room. A detailed log was completed in accordance with GT.01, *Logging Alluvial and Bedrock Material* (EG&G 1992a). The geologists performing these procedures received specific core logging training.

Upon completion, the detailed core logs were reviewed by a logging supervisor and then entered into RFEDS using a field module computer program named LOGGIT. The borehole log data were then integrated with the geologic logging package to create graphic borehole logs using LOGGER software. This procedure was accomplished in accordance with FO. 14, *Field Data Management* (EG&G 1992b), which specified quality assurance/quality control of the data throughout the project. The LOGGER borehole logs are presented in Appendix B of this report.

All of the core recovered was labeled and later photographed in the core box. One copy of each photograph is submitted in a binder under separate cover. A second copy of each photograph was placed in the appropriate well file.

### **3.6 WASTE HANDLING FOR INSTALLED WELLS**

The environmental materials generated from the installation of monitoring wells were handled in accordance with FO.10, *Receiving, Labeling, and Handling Environmental Materials Containers* (EG&G 1992b) as described in Section 2.7.

### **3.7 DECONTAMINATION**

Decontamination of heavy equipment and general equipment for the installation of monitoring wells was conducted in the same manner as for the well abandonments and is described in Section 2.8.



#### 4.0 GEOTECHNICAL BOREHOLES

Three geotechnical boreholes were drilled in the Contractor's Yard and adjacent parking lots in support of a proposed sewer line installation. The boreholes were designated 52194, 52294, and 52394. The geotechnical borehole locations are plotted in Figure 1. The drilling and sampling of these boreholes was performed in accordance with GT.02, *Drilling and Sampling Using Hollow-stem Auger Techniques* (EG&G 1992a) and ASTM D-1586, *Method for Penetration Test and Split-Barrel Sampling of Soils* (ASTM 1992).

A geotechnical laboratory performed the geotechnical laboratory testing and conducted a geotechnical engineering study. A report summarizing their findings and presenting their conclusions and recommendations is included in this report as Appendix E.

Boreholes 52194 and 52294 were drilled to a depth of 13 feet and borehole 52394 was drilled to 29 feet. Continuous Standard Penetration Tests (ASTM 1992) and split-spoon samples of the boreholes were collected in each borehole from ground surface to total depth. The split spoon samples were submitted to the geotechnical laboratory for testing. Grain size and soil classification testing (ASTM methods D-422, D-2487, and D-4318) were performed for each soil type encountered. In addition, strength testing (ASTM methods D-2850, D-3080, and D-4829) was performed on soil samples taken from borehole 52394. Finally, one soil sample was collected immediately above the alluvium/bedrock contact in the same borehole and a hydraulic conductivity test (ASTM method D-5084) was performed on this sample.

The continuous split-spoon samples collected at the sites were logged in the field by the geologist in charge of the drilling. The core was then transported to a core logging room where a more detailed log was completed. The core was photographed, and copies of the photographs were handled in the same manner as the photographs of the borehole core, described in Section 3.6.

The drill cuttings were placed in drums that were handled in the same way as cuttings from the other well installations.

Each geotechnical borehole was abandoned immediately after it was completed and all samples had been collected. The boreholes were abandoned in accordance with GT.05, *Plugging and Abandonment of Boreholes* (EG&G 1992a). Permanent markers were installed to create an adequate surface seal for each borehole so that they could be located in the future.

## 5.0 SYSTEMATIC EVALUATION PROGRAM BOREHOLES

A Systematic Evaluation Program (SEP) is investigating the seismic response of structures, systems, and components at RFETS. Six soil boreholes were drilled in support of a seismic hazard study to an approximate depth of 200 feet each. The SEP borehole locations are shown in Figure 1. The SEP boreholes are numbered 69194, 69294, 69394, 69494, 69594, and 69694. The results of the SEP investigation can be found in a draft report titled, *Evaluation of the Capability of Inferred Faults in the Vicinity of Building 371, Rocky Flats Environmental Technology Site, Colorado* (Geomatrix 1995).

### 5.1 PREDRILLING ACTIVITIES

Soil disturbance permits for the SEP borehole locations were obtained by technical representatives of the Engineering Department of EG&G. Biological surveys were conducted in the area of the boreholes, and ingress and egress routes were flagged. Utility screenings and borehole clearances were provided by the Construction Management Department. A pre-evolution meeting was held with the crew who would be working on this phase of the project. A readiness review was completed and approved.

Bicron Analyst FIDLER surveys were completed for each of the SEP locations. None of the site surveys indicated readings elevated above background (see Section 2.1).

### 5.2 DRILLING METHOD/SURFACE CASING INSTALLATION

Surface casings consisting of 6-inch nominal ID, Schedule 80 PVC were installed in a 10-5/8-inch diameter borehole to a depth of 20 feet. Hollow-stem auger techniques were used following GT.02, *Drilling and Sampling Using Hollow-stem Auger Techniques* and GT.03, *Isolating Bedrock from Alluvium with Grouted Surface Casing* (EG&G 1992a). Grout consisting of portland cement and reduced pH bentonite was installed using a tremmie pipe into the annulus between the borehole and the casing to grout the surface casing in place.

After setting a minimum of 24 hours, the boreholes were then drilled through the surface casing to total depth using a Failing Model 1500 drilling rig.

Drilling was performed in accordance with GT.01, *Logging Alluvial and Bedrock Material* and GT.04, *Rotary Drilling and Rock Coring* (EG&G 1992a).

### 5.3 GEOLOGIC LOGGING

Soil cuttings were collected in 1-pint Mason® jars every 5 feet. A field lithologic log was created using these cuttings. The cuttings were field screened for organics using a photoionization detector and for radionuclides using an A-100 Bicon Frisktech (alpha) and a Ludlum 31 (beta) with a 44-9 probe in accordance with *Environmental Management Radiological Guidelines* (EG&G 1991b). The cuttings were transported to a core-logging room where a more detailed lithologic log was created.

### 5.4 WASTE HANDLING

Soil/drill cuttings from these wells were handled as described in Section 3.2.4.

PPE and field trash from the SEP borings were handled as described in Section 2.7.2 of this report.

### 5.5 GEOPHYSICAL BOREHOLE LOGGING

Geophysical surveys were performed in accordance with GT.15, *Geophysical Borehole Logging* (EG&G 1992a). One or all of the following geophysical tools were used in the SEP boreholes: natural gamma, density, neutron, and induction. The field geophysical logs were immediately delivered to the EG&G onsite geologist for interpretation. Final copies of the logs are included in Appendix C.

## **5.6 SYSTEMATIC EVALUATION PROGRAM BOREHOLE ABANDONMENT**

The six SEP boreholes were abandoned with surface casing in place after the geophysical logging was completed. Bentonite grout was placed in the borehole using either a tremmie pipe or the drilling rods. The boreholes were filled to ground surface, and the grout was allowed to settle for a minimum of 24 hours. The surface casings were cut off at ground surface. Next, a cement plug was installed from the top of the grout to ground surface. An aluminum monument with the inscribed borehole number was placed in the center of the plug.

Site reclamation was completed, and the sites of the SEP boreholes were not reseeded because follow-up excavation activity planned in the area would impact site vegetation.

## 6.0 GEOPHYSICAL ASSESSMENTS

Twenty-eight monitoring wells and piezometers were geophysically surveyed and assessed during FY94 WARP. The assessments consisted of geophysical (electric) downhole logging and downhole video surveys.

### 6.1 GEOPHYSICAL SURVEYS

Twenty-five monitoring wells/piezometers were geophysically surveyed using a cased-hole density log ( $4\pi$ /gamma-gamma) with natural gamma-ray in accordance with GT.15, *Geophysical Borehole Logging* (EG&G 1992a). Wells 24193, 24393, and 24993 were geophysically surveyed with the natural gamma-ray and neutron logging tools before they were abandoned. The final geophysical logs are presented in Appendix C of this report.

### 6.2 VIDEO SURVEYS

Downhole video surveys were conducted to determine the depth and condition of the screen interval of 28 wells/piezometers (25 wells that were geophysically surveyed plus three additional). A borehole camera, tripod, winch system, generator, video cassette recorder, video monitor, and video cassettes were used. A security camera pass was obtained to operate the camera system.

Video survey tapes will be viewed, and the information gained from the tapes along with the analysis of the geophysical logs will allow recommendations to be made about which wells can be included in the GMP and which should be included in the FY95 WARP abandonments. Table 6 is a summary of the wells that were video surveyed. Video records of subsurface (borehole) inspections performed with the borehole camera will be stored with the document control records for this project and are not included with this report.

## **7.0 RISER EXTENSION INSTALLATION**

Riser extensions were installed on groundwater monitoring wells 72093 and 72393 and on the adjacent methane vent 44592 in the Present Landfill to accommodate the addition of more fill material around the wells. The riser extensions were re-surveyed, and the new elevations and changes in the total depths are reflected in the RFEDS database.

### **7.1 METHANE MONITORING WELL**

Ten feet of 8-inch steel casing was detached and removed at the base of the protective casing, which was installed as part of the 1993 WARP. A semicircular piece of casing at the top of the protective casing was removed. Then, one 4-inch diameter by 10-foot-long Schedule 40 PVC riser was screwed onto the existing blank casing of the methane well. An 8-inch steel protective casing, 20 feet long, was attached to the bolting fastener, resulting in a 10-foot addition. The semicircular piece of casing that had been at the top of the protective casing was reattached. The four 3-inch protective posts were then extended and filled with concrete.

### **7.2 GROUNDWATER MONITORING WELLS**

Two-inch-diameter by 10-foot, Schedule 40 PVC risers were screwed onto the existing threaded blank casings of monitoring wells 72093 and 72393. Then, 8-inch-diameter, 10-foot sections of Schedule 80 gray PVC casings were attached to the existing protective casings using Schedule 80 couplings. Figure 6 illustrates the riser extensions.

After the riser extensions were completed, the earth movers added to the elevation of the area surrounding the wells. The protective casings appeared to have been bent as a result of earth movement. Bailers were sent down the wells to check their condition. The inner casings appeared to be undisturbed.

## 8.0 LAND SURVEYING

After the well abandonments, well installations, geotechnical borehole installations, SEP borehole installations, geophysical surveys, and riser extensions were completed, they were land surveyed by a Colorado-licensed land surveyor (second-tier subcontractor) to determine their final locations and elevations. In addition, certain locations that were not listed in the Work Plan (EG&G 1994a) were also land surveyed. The following is a list of the types and number of locations that were surveyed as part of the 1994 WARP:

<u>Type of Location</u>	<u>Number of Locations Surveyed</u>
Abandoned Wells (Except abandoned well 0788 that was covered with soil by road graders and could not be located for survey, and well 4986 that was abandoned after the surveyors had completed work.)	37
Abandoned Boreholes	2
Installed Wells	17
Installed Offsite Wells (plotted on Figure 2)	2
Repaired Wells/Piezometers	6
Geotechnical Boreholes	3
SEP Boreholes	6
Geophysically Surveyed Locations (some of which fit other categories)	28
Piezometers (B317189, 308-P1, 308-P2)	3
Geoprobos (BH1, BH2, BH3, BH4, BH5)	5
Americium Zone Wells (00391, 11791, 60194, 60294, 60394, 60494, 60594, 60694, 60794, 60894, 60994, 61094, 61194, 61294, 61394, 61494, 61594, 61694, 61794, 61894, 61994)	21

The above locations were plotted on Figure 1 except for (1) the offsite wells that were plotted on Figure 2 and (2) the Americium Zone Wells that were too numerous and close together to fit on a map of this scale.



The survey was conducted in accordance with GT.17, *Land Surveying* (EG&G 1992a). The final location of each well is reported in Colorado central zone true state plane coordinates using North American Datum (NAD) 27. Three elevation measurements were made on the new or existing wells: (1) the elevation of the base of the concrete pad (ground level), (2) the elevation of the top of the inner well casing, and (3) the elevation of the top of the protective casing. All measurements were taken on the north sides of the wells. The only elevation measurement that was made on the abandoned wells was taken from the top of the aluminum monument in the concrete pad.

The survey locations for each well are listed in Tables 1, 4, and 5. Original survey data are located in Appendix D.

## **9.0 REGULATORY REPORTING REQUIREMENTS**

Well abandonments implemented at RFETS are administratively required to meet Rule 11, Code of Colorado Regulations (CCR), 1987, *Revised and Amended Rules and Regulations of the Board of Examiners of Water Well Construction and Pump Installation Contractors*, 2 CCR 402-2, August 1. This regulation requires that the well abandonment report be completed by the person responsible for plugging the well. The report must then be submitted to the Office of the State Engineer by a DOE representative. In addition, GT.5, *Plugging and Abandonment of Boreholes* (EG&G 1992a), specifies the completion of Form GT.5A, Well/Borehole Abandonment Form. These forms serve to document well and abandonment techniques and equipment used.

### **9.1 WELL ABANDONMENT REPORTS**

During 1994, the WARP abandoned 39 wells. State of Colorado Well Abandonments Reports were completed and filed with the Office of the State Engineer.

### **9.2 WELL INSTALLATION NOTIFICATION**

During 1994, 19 new wells were installed under the WARP. Permits to construct a well as specified under 2 CCR 402-2 (CCR 1987) were completed for 19 of the wells that required DOE signature and application to the Colorado Division of Water Resources.

During 1994, revisions to GT.6, *Monitoring Well and Piezometer Installation* (EG&G 1992a), added the Well Installation Notification Form GT.6A to the OP. This form served to track newly installed wells administratively as specified by DOE. Forms for 19 of these wells were completed. These forms were used to complete the documentation needed for the Notice of Intent to Construct a Well that DOE submitted to the Office of the State Engineer.

## 10.0 REFERENCES

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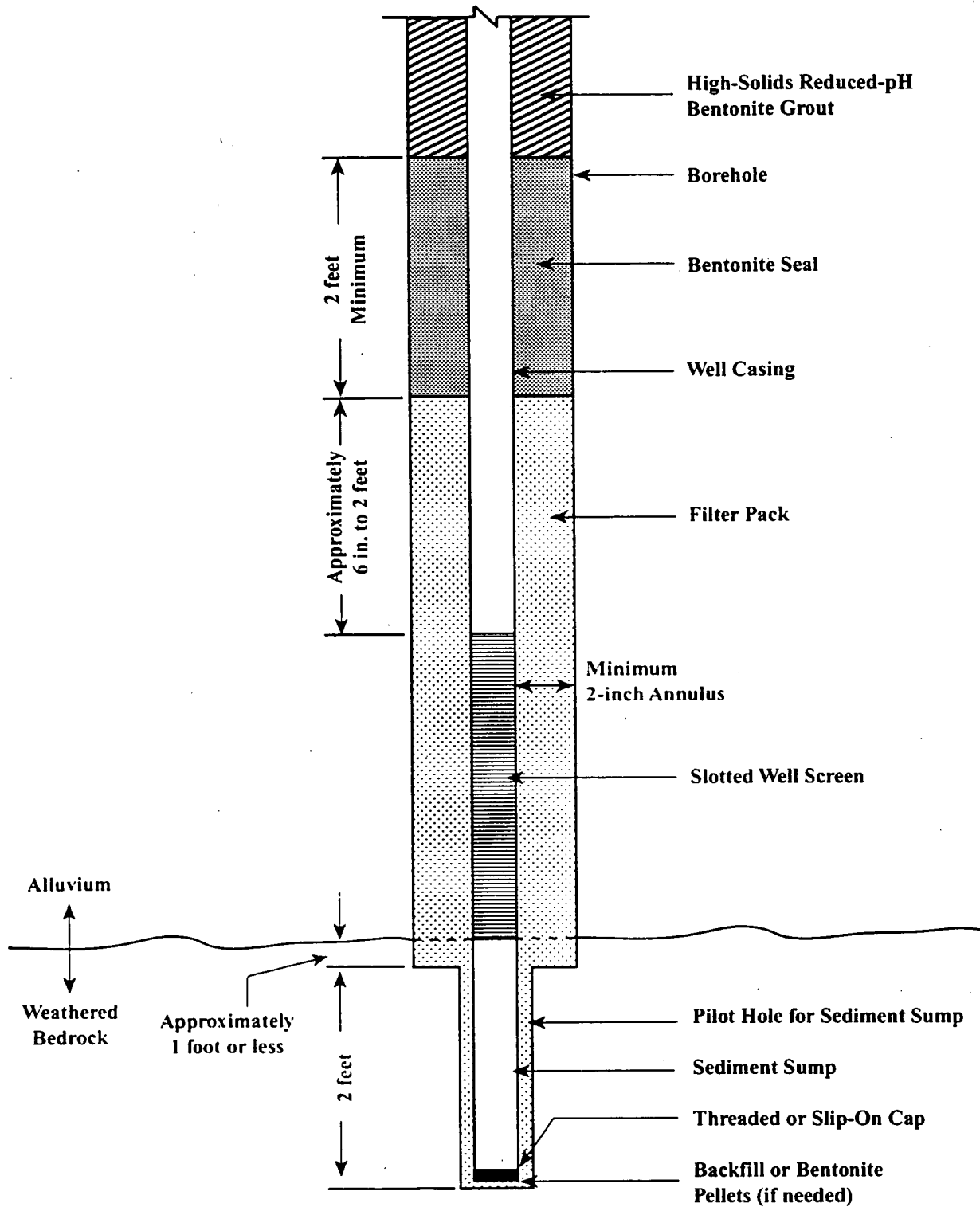
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U.S. DOE 1991a (August). *Phase I RFI/RI Work Plan, Woman Creek Priority Drainage, Operable Unit No. 5.* Prepared for the U.S. Department of Energy, Rocky Flats Plant.

U.S. DOE 1991b (September). *Phase I RFI/RI Work Plan, Walnut Creek Priority Drainage, Operable Unit No. 6.* Prepared for the U.S. Department of Energy, Rocky Flats Plant.

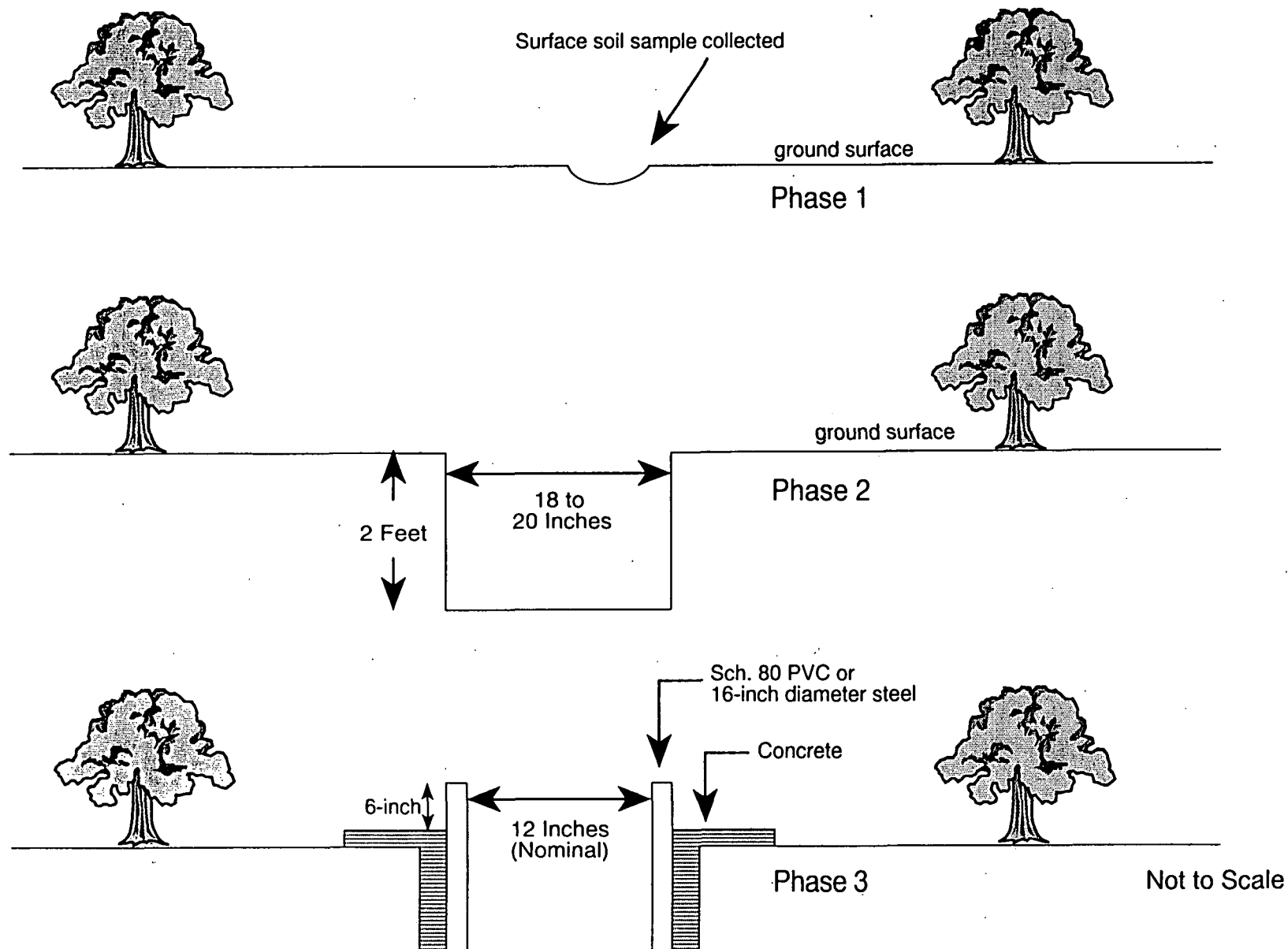
U.S. DOE 1990 (June 29). *General Environmental Protection Program, DOE Order 5400.1.*

**FIGURE 3**  
**Schematic Diagram of Alluvial Monitoring Well Completion**

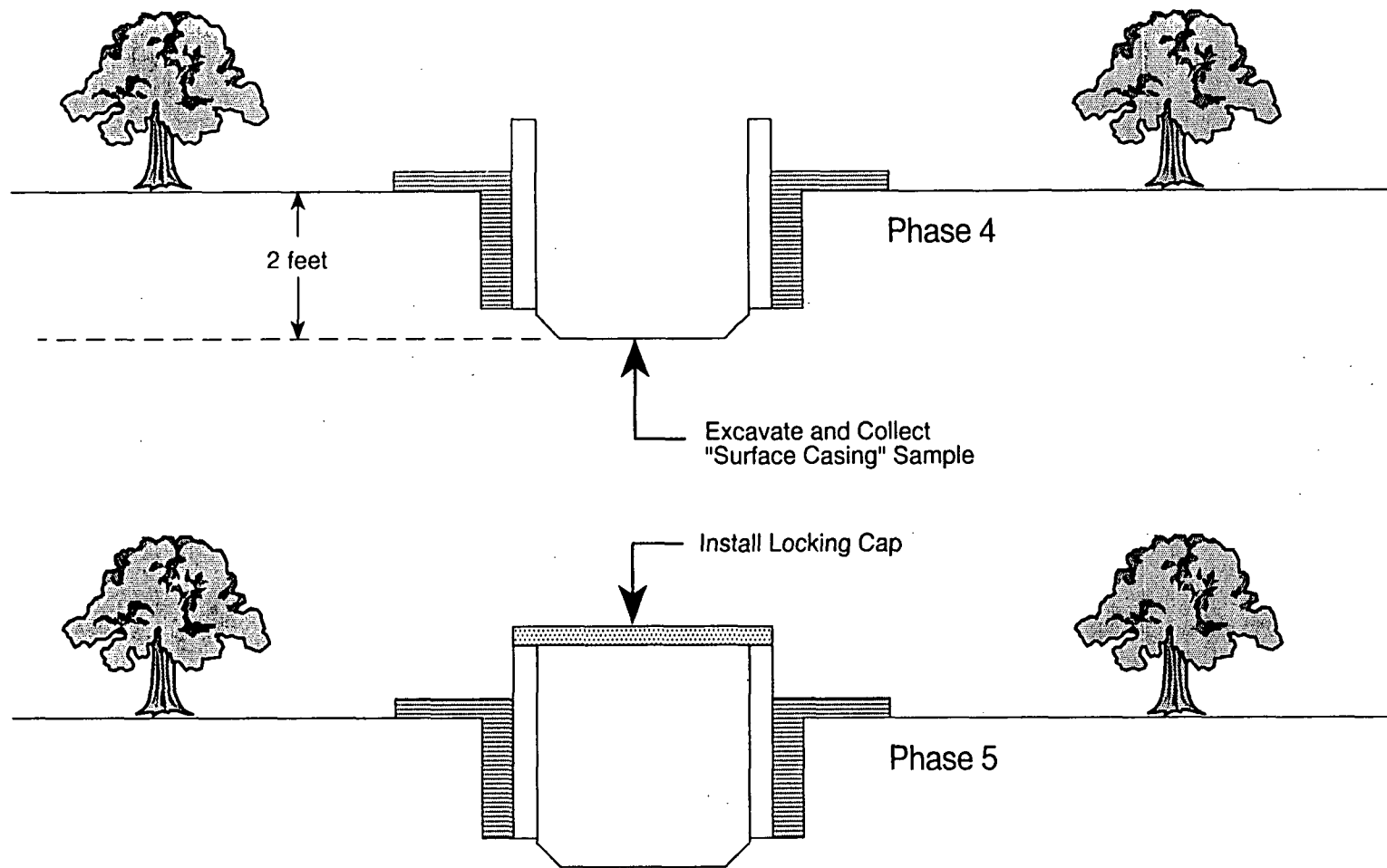


Not to Scale

Taken from: GT.06, Monitoring Well and Piezometer Installation (EG&G 1992a)

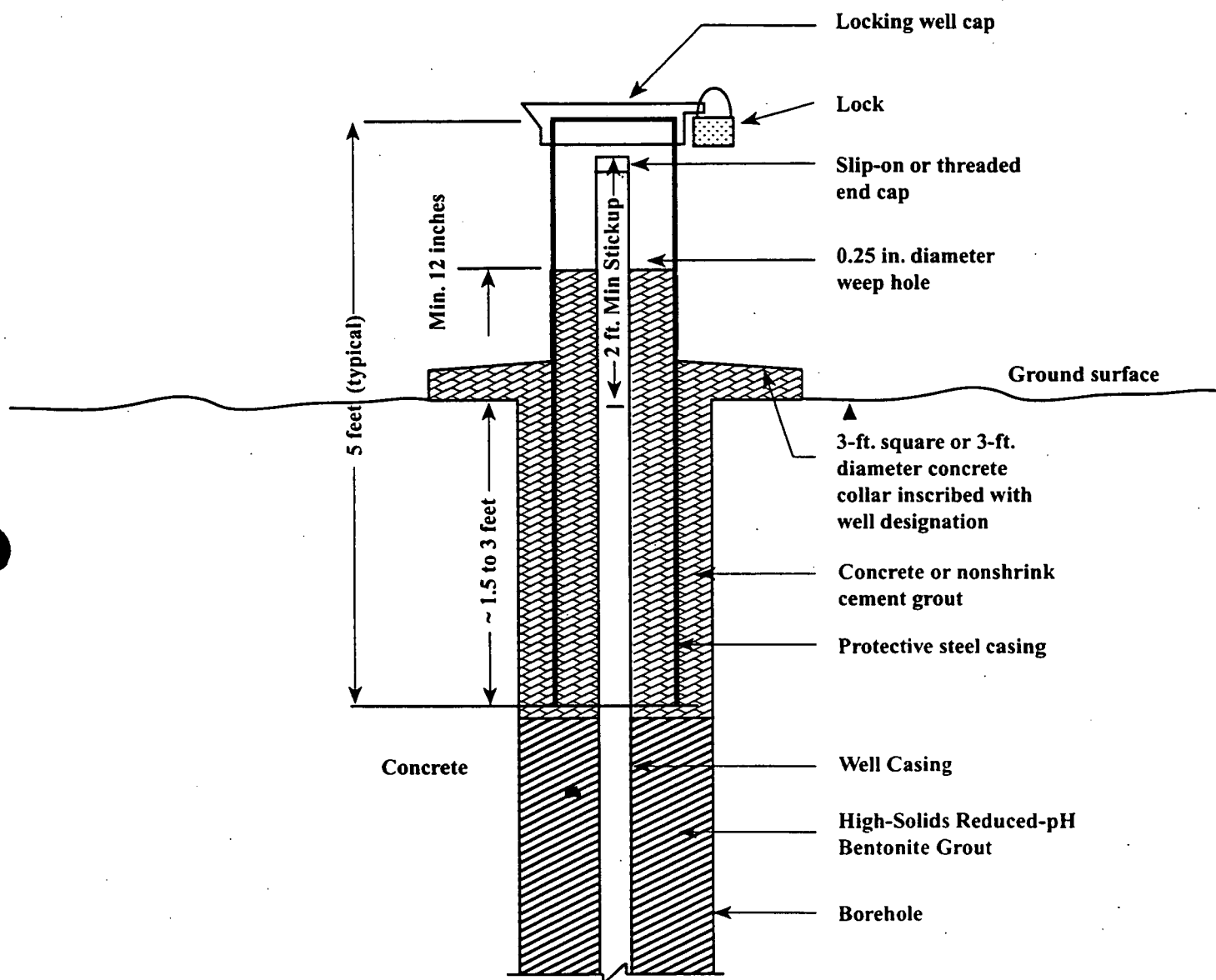


**FIGURE 4**  
**Schematic Diagrams of the Phases of**  
**Specialized Surface Casing Installation**



**FIGURE 4 (continued)**  
**Schematic Diagrams of the Phases of**  
**Specialized Surface Casing Installation**

**FIGURE 5**  
**Schematic Diagram of a Standard Monitoring Well Surface Completion**



Not to Scale

Taken from: GT.06, Monitoring Well and  
 Piezometer Installation (EG&G 1992a)



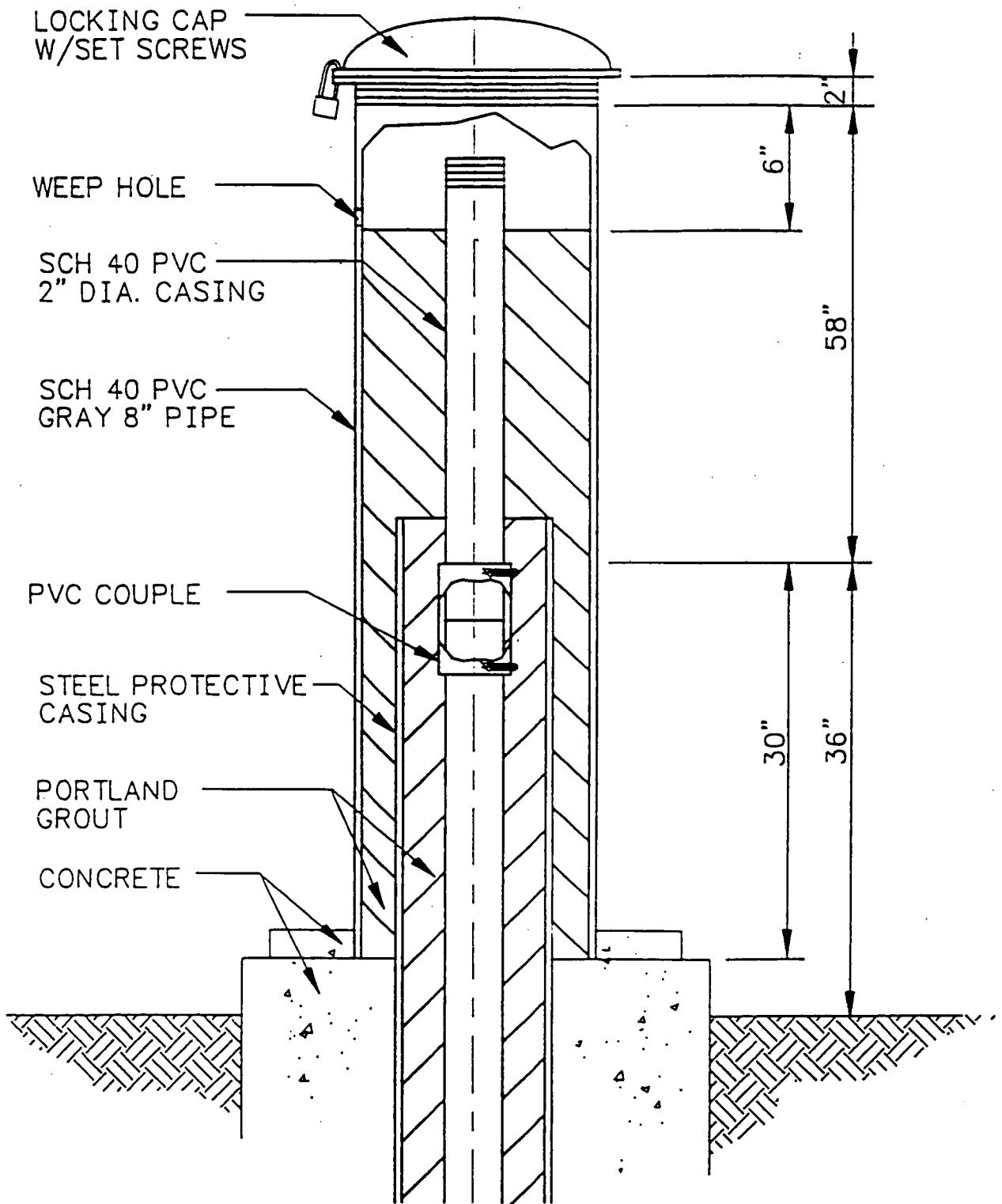


FIGURE 6  
SCHEMATIC RISER  
CONSTRUCTION DIAGRAM

**TABLE 1**  
**WELL ABANDONMENT INFORMATION SUMMARY - FY94 WARP**  
**Rocky Flats Environmental Technology Site**

WELL NO.	COLORADO STATE COORDS		GROUND SURFACE ELEVATION (FT)	ZONE OF COMPLETION	CASING MATERIAL	CSG ID (IN)	ABANDONMENT METHOD	CONSTRUCTED TOTAL DEPTH BGS (FT)	MEASURED TOTAL DEPTH BGS (FT)	REASON FOR ABANDONMENT	STICK UP (IN)	CASING REMOVED BGS (FT)	CASING LEFT BGS (FT)	ABAND. DATES		DEPTH OF WATER (FT)	DEPTH OF ABAND. (FT) BGS
	NORTH	EAST												START	END		
0154	750987	2084444	5977.0	BEDROCK	STEEL	12	IN PLACE	13.85	10.2	INS. DATA	3.80	3.80	10.20	07/25/84	07/25/84	DRY	10.20
0254	750053	2084736	5967.9	BEDROCK	STEEL	12	IN PLACE	26.15	23.8	INS. DATA	ND	0	23.80	07/28/84	07/27/84	DRY	23.80
0354	750052	2084755	5967.1	BEDROCK	STEEL	12	IN PLACE	27.83	24.2	INS. DATA	ND	0	24.20	07/28/84	07/27/84	DRY	24.20
0188	748963	2080547	6056.1	ALLUVIUM	NONE	N/A	IN PLACE	N/A	N/A	FINISH PREV. ABAND.	-	-	-	05/10/84	05/10/84	DRY	SURF. PAD
5070	751028	2084211	5962.6	ALLUV/BDRK	PVC	1.5	CSG DESTRUCT	24.09	20.65	INS. DATA	ND	24.09	0	05/31/84	06/01/84	12.11	20.65
5170	750621	2083628	5986.4	ALLUVIUM	PVC	6	IN PLACE	13.25	13.2	INS. DATA	1.00	1.00	13.25	05/18/84	05/18/84	6.52	13.25
5270	750631	2083643	5986.2	ALLUVIUM	PVC	6	IN PLACE	13.37	13.3	INS. DATA	ND	0	13.37	05/18/84	05/18/84	6.54	13.37
5570	749658	2084885	5974.2	BEDROCK	PVC	1.5	CSG DESTRUCT	39.53	39.68	INS. DATA	ND	39.53	0	06/01/84	07/25/84	6.55	39.68
5670	750712	2083670	5985.9	BEDROCK	STEEL	2	IN PLACE	32.78	33	INS. DATA	ND	0	32.79	05/23/84	05/23/84	21.42	32.79
5071	749031	2081911	6028.8	ALLUVIUM	PVC	4	IN PLACE	17.07	18	INS. DATA	0.50	0	18.00	05/04/84	05/04/84	2.50*	18.00
5171	750131	2084021	5987.1	ALLUV/BDRK	PVC	4	IN PLACE	9.03	9	INS. DATA	0	0	9.03	05/20/84	05/20/84	6.62	9.03
5271	751021	2084168	5965.6	ALLUV/BDRK	PVC	4	IN PLACE	14.91	14.67	INS. DATA	0	0	14.91	05/23/84	05/23/84	DRY	14.91
5671	749148	2081528	6037.2	ALLUVIUM	PVC	4	IN PLACE	12.80	12	INS. DATA	0.35	0	11.87	05/03/84	05/04/84	3.67	12.00
5771	750543	2084421	5978	ALLUV/BDRK	PVC	4	IN PLACE	7.00	7	INS. DATA	0	0	7.00	07/22/84	07/22/84	DRY	7.00
5871	750655	2084388	5978.4	ALLUV/BDRK	PVC	4	IN PLACE	10.81	10.5	INS. DATA	ND	0	10.81	05/19/84	05/19/84	3.90*	10.81
5971	749205	2084124	5992.6	ALLUV/BDRK	PVC	4	IN PLACE	10.17	9.9	INS. DATA	ND	0	9.90	05/25/84	05/25/84	6.60	9.90
6071	749030	2084051	5992.9	ALLUVIUM	PVC	4	IN PLACE	ND	ND	INS. DATA	ND	0	ND	05/25/84	05/25/84	DRY	ND
6271	749118	2083775	6000.9	ALLUVIUM	PVC	3	IN PLACE	9.29	9.5	INS. DATA	ND	0	9.50	05/25/84	05/25/84	8.50	9.50
6874	752227	2080249	6035.0	ALLUVIUM	PVC	3	CSG DESTRUCT	88.00	37.1	INS. DATA	ND	37.40	0	08/15/84	08/16/84	37.10	37.4
4986	748964	2078287	ND	ALLUVIUM	ST. STEEL	2	CSG DESTRUCT	69.00	67.1	LENGTH OF SCREEN	2.00	58.00	11.00	10/08/84	10/10/84	51.70*	58.00
0587	748081	2084849	5927.9	BEDROCK	ST. STEEL	2	IN PLACE	51.50	50.83	DAMAGED	ND	0	51.00	05/10/84	05/11/84	42.99	51.00
0188	750800	2083298	5955.3	ALLUVIUM	PVC	1	IN PLACE	ND	0	INS. DATA	0	0	ND	05/18/84	05/18/84	DRY	ND
0288	750537	2083057	5970.2	ALLUVIUM	PVC	1	IN PLACE	ND	0	INS. DATA	0	0	ND	05/18/84	05/18/84	DRY	ND
0388	750130	2083614	5991.1	ALLUVIUM	PVC	1	IN PLACE	6.45	5.45	INS. DATA	0	0	6.45	05/20/84	05/20/84	0.80	6.45
0488	749853	2083367	5998.2	ALLUVIUM	PVC	1	IN PLACE	5.01	5	INS. DATA	0	0	5.01	05/17/84	05/17/84	3.14*	5.01
0588	749602	2083893	5987.3	ALLUVIUM	PVC	1	IN PLACE	6.83	6.8	INS. DATA	0	0	6.83	05/17/84	05/17/84	4.98*	6.83
0688	749633	2084484	5977.1	BEDROCK	PVC	1	IN PLACE	10.45	10.4	INS. DATA	0	0	10.45	05/17/84	05/17/84	2.60*	10.45
0788	750247	2086025	ND	ALLUVIUM	PVC	1	IN PLACE	12.33	10.33	INS. DATA	2.00	0	9.33	05/04/84	05/04/84	5.20*	10.33
0888	748968	2082154	6025.9	ALLUVIUM	PVC	1	IN PLACE	8.15	7.9	INS. DATA	0	0	8.15	05/08/84	05/08/84	5.90	8.15
0988	749071	2083054	6009.7	ALLUVIUM	PVC	1	IN PLACE	10.39	10	INS. DATA	0	0	10.00	05/05/84	05/05/84	3.20	10.00
1088	749781	2084041	5984.5	ALLUVIUM	PVC	1	IN PLACE	10.45	10.4	INS. DATA	0	0	10.45	05/20/84	05/20/84	3.43*	10.45
1188	748613	2083683	6004.1	ALLUVIUM	PVC	1	IN PLACE	13.49	10.23	NOT NEEDED	2.80	2.80	10.63	08/18/84	08/18/84	7.25	10.63
45091	757431	2078976	6035.2	ALLUVIUM	PVC	4	IN PLACE	42.30	42.43	NOT NEEDED	ND	0	41.00	05/10/84	05/11/84	21.43	42.43
45191	757407	2078503	6042.8	ALLUVIUM	PVC	4	IN PLACE	42.00	38.98	NOT NEEDED	ND	0	45.00	05/09/84	05/10/84	20.64	45.00
45291	757780	2076729	6037.0	ALLUVIUM	PVC	4	IN PLACE	41.80	42.1	NOT NEEDED	ND	0	41.80	05/09/84	05/11/84	22.01	41.80
24193	749807	2086905	5956.5	BEDROCK	PVC	4	OVERDRILL	75.00	75	LENGTH OF SCREEN	2.97	75.00	0	09/14/84	09/19/84	27.50	75.00
24393	749788	2086908	5957.1	BEDROCK	ST. STEEL	4	OVERDRILL	74.50	70.5	LENGTH OF SCREEN	1.01	70.00	0	09/22/84	09/23/84	26.40	73.00
24993	749809	2086909	5956.3	BEDROCK	PVC	2	OVERDRILL	78.00	71.55	LENGTH OF SCREEN	1.88	70.50	0	09/12/84	09/13/84	26.53	78.00
25093	749787	2086912	5957.2	BEDROCK	PVC	2	OVERDRILL	71.00	70.4	LENGTH OF SCREEN	0.80	70.40	0	09/20/84	09/20/84	ND	73.00
ABANDONED BOREHOLES																	
10494	753886	2088538	5759.6	NA	NA	NA	NA	10.40	10.4	COMPROMISE SAN. SE	NA	NA	NA	08/14/84	08/14/84	5.11	10.40
11194	743082	2091944	5685.7	NA	NA	NA	NA	9.00	9	FAILED TO PRODUCE	NA	NA	NA	07/20/84	07/21/84	DRY	9.00
REPAIRED WELLS																	
4087	753143	2084823	5883.0	ALLUVIUM	ST. STEEL	2	REPAIR CSG	6.70	NA	DAMAGED	NA	NA	NA	NA	NA	NA	NA
6887	752150	2083325	5982.3	ND	ND	2	REPAIR POSTS AND PAD	ND	ND	DAMAGED	ND	NA	NA	08/09/84	08/09/84	NA	NA
42893	750611	2084452	5978.1	ALLUVIUM	PVC	2	REPAIR PAD	12.00	NA	DAMAGED	NA	NA	NA	NA	NA	NA	NA

See Appendix D for exact coordinate data.

ALLUV = Alluvium  
 BDRK = Bedrock  
 bgs = below ground surface  
 compromise san seal = compromised sanitary seal  
 CSG = Casing  
 FT = feet  
 ID = inside diameter  
 IN = inches  
 INS data = Insufficient data  
 NA = NOT APPLICABLE  
 ND = NOT DETERMINED IN THIS INVESTIGATION  
 pvc = polyvinyl chloride  
 ST. STEEL = stainless steel  
 \* = BELOW TOP OF CASING

**TABLE 2**  
**1994 WARP SAMPLING MATRIX**  
**Rocky Flats Environmental Technology Site**

OU	WELL	INTERVAL	ANNULAR ABANDONMENTS (BP)	INSTALLATIONS (BH)
2	10194			VOA, MET, RADS
4	0154 42893		VOA, SVOC, MET, RADS	
5	10294 10394 10994 11094	VOA-D2' C6'		VOA, SVOC, MET, RADS
6	10494 10594 10694 10794 10894			VOA, MET, RADS
7	10094 4087*	D2'-SOIL C4' - ROCK	VOA, SVOC, MET, RADS (+PCB, NITRATE)	VOA, SVOC, MET, RADS
8	5170 5270 5670 5171 0188 0288 0588		VOA, SVOC, MET, RADS	
9	5070 5271 5671 0388 0788 0888		VOA, SVOC, MET, RADS	
10	0254 0354		VOA, SVOC, MET, RADS	
11	11294* 11394*			No Samples No Samples
13	5071 0988		VOA, MET, RADS	

**TABLE 2**  
**1994 WARP SAMPLING MATRIX**  
**Rocky Flats Environmental Technology Site**

OU	WELL	INTERVAL	ANNULAR ABANDONMENTS (BP)	INSTALLATIONS (BH)
14	6271		VOA, MET, RADS	
15	5971 6071		VOA, MET, RADS	
Sitewide	5570 5771* 0488 0688 1088 11194 11494 11594		VOA, MET, RADS (PCB [Pu for preabandonment soil screen])	VOA, MET, RADS       No samples No samples

RADS = Gross A, Gross B, U(233/234, 235, 238), Pu(239/240), Am(241), Sr(89/90), Cs(137), Ra(226/228)

**TABLE 3**  
**1994 WELL ABANDONMENT AND REPLACEMENT PROGRAM**  
**DRUM CHARACTERIZATION SUMMARY**  
**Rocky Flats Environmental Technology Site**

Site Number	Drum Number	Drum Size (gal)	Date Filled	Drum Contents	Drum Footage	Associated 'BP' Number	Associated 'BH' Number
5070	4490JE	30	5/31/94	Soil	10-20	BP00152,159JE	—
	4491JE	30	5/31/94	Soil	0-10	BP00152,159JE	—
	4492JE	30	5/31/94	Soil	0-24	BP00152,159JE	—
	4494JE	30	5/31/94	Soil	20-24	BP00152,159JE	—
5570	4483JE	30	5/25/94	Soil	0-28	BP00150JE	—
	4484JE	30	5/25/94	Soil	0-33	BP00150JE	—
	4485JE	30	5/25/94	Soil	35-39	BP00150JE	—
	4486JE	30	5/25/94	Soil	33-35	BP00150JE	—
	4487JE	30	5/25/94	Soil	35-39	BP00151JE	—
	4488JE	30	5/25/94	Soil	0-39	BP00151JE	—
	4489JE	30	5/25/94	Soil	0-39	BP00151JE	—
4986	4869JE	30	10/6/94	Soil	0-58	BP00187JE	—
	4873JE	30	10/6/94	Soil	0-58	BP00187JE	—
	4874JE	30	10/7/94	Soil	0-58	BP00187JE	—
	4875JE	30	10/6/94	Soil	0-58	BP00187JE	—

**TABLE 3**  
**1994 WELL ABANDONMENT AND REPLACEMENT PROGRAM**  
**DRUM CHARACTERIZATION SUMMARY**  
**Rocky Flats Environmental Technology Site**

Site Number	Drum Number	Drum Size (gal)	Date Filled	Drum Contents	Drum Footage	Associated 'BP' Number	Associated 'BH' Number
24193	4829JE	30	9/9/94	Concrete	Surface	BP00175-177JE	—
	4830JE	30	9/9/94	Concrete	Surface	BP00175-177JE	—
	4833JE	30	9/9/94	Concrete	Surface	BP00175-177JE	—
	4836JE	30	9/19/94	Soil	0-75	BP00180JE	—
	4837JE	30	9/19/94	Soil	0-75	BP00180JE	—
	4838JE	30	9/19/94	Soil	0-75	BP00180JE	—
	4839JE	30	9/19/94	Soil	0-75	BP00180JE	—
	4840JE	30	9/19/94	Soil	0-75	BP00181JE	—
	4841JE	30	9/19/94	Soil	0-75	BP00181JE	—
	4842JE	30	9/19/94	Soil	0-75	BP00181JE	—
	4843JE	30	9/19/94	Soil	0-75	BP00181JE	—
	4848JE	30	9/19/94	Soil	0-75	BP00182JE	—
24393	4829JE	30	9/9/94	Concrete	Surface	BP00175-177JE	—
	4830JE	30	9/9/94	Concrete	Surface	BP00175-177JE	—
	4833JE	30	9/9/94	Concrete	Surface	BP00175-177JE	—
	4853JE	30	9/23/94	Soil	0-73	BP00185JE	—
	4854JE	30	9/23/94	Soil	0-73	BP00186JE	—
	4856JE	30	9/23/94	Soil	0-73	BP00186JE	—
	4857JE	30	9/23/94	Soil	0-73	BP00185JE	—
	4858JE	30	9/23/94	Soil	0-73	BP00185JE	—
	4859JE	30	9/22/94	Soil	0-55	BP00184JE	—
	4860JE	30	9/23/94	Soil	0-73	BP00186JE	—
	4861JE	30	9/23/94	Soil	0-73	BP00185JE	—
	4868JE	30	9/23/94	Soil	0-73	BP00186JE	—

**TABLE 3**  
**1994 WELL ABANDONMENT AND REPLACEMENT PROGRAM**  
**DRUM CHARACTERIZATION SUMMARY**  
**Rocky Flats Environmental Technology Site**

Site Number	Drum Number	Drum Size (gal)	Date Filled	Drum Contents	Drum Footage	Associated 'BP' Number	Associated 'BH' Number
24993	4795JE	30	9/13/94	Soil	0-70	BP00178JE	—
	4828JE	30	9/13/94	Soil	0-70	BP00178JE	—
	4829JE	30	9/9/94	Concrete	Surface	BP00175-177JE	—
	4830JE	30	9/9/94	Concrete	Surface	BP00175-177JE	—
	4831JE	30	9/12/94	Concrete	Surface	BP00178JE	—
	4832JE	30	9/13/94	Soil	0-70	BP00178JE	—
	4833JE	30	9/9/94	Concrete	Surface	BP00175-177JE	—
	4834JE	30	9/12/94	Concrete	Surface	BP00178JE	—
	4835JE	30	9/13/94	Soil	0-70	BP00178JE	—
25093	4829JE	30	9/9/94	Concrete	Surface	BP00175-177JE	—
	4830JE	30	9/9/94	Concrete	Surface	BP00175-177JE	—
	4833JE	30	9/9/94	Concrete	Surface	BP00175-177JE	—
	4849JE	30	9/20/94	Soil	0-73	BP00183JE	—
	4850JE	30	9/20/94	Soil	0-73	BP00183JE	—
	4851JE	30	9/20/94	Soil	0-73	BP00183JE	—
	4852JE	30	9/20/94	Soil	0-73	BP00183JE	—
10094	4762JE	30	7/21/94	Soil	0-2	BP00168JE	—
	4767JE	30	7/21/94	Soil	0-2	BP00168JE	—
	4768JE	30	7/21/94	Soil	0-2	BP00168JE	—
	4791JE	30	8/3/94	Soil	2.2-9.0	—	BH00179, 83, 84JE

**TABLE 3**  
**1994 WELL ABANDONMENT AND REPLACEMENT PROGRAM**  
**DRUM CHARACTERIZATION SUMMARY**  
**Rocky Flats Environmental Technology Site**

Site Number	Drum Number	Drum Size (gal)	Date Filled	Drum Contents	Drum Footage	Associated 'BP' Number	Associated 'BH' Number
10194	4724JE	30	7/6/94	Soil	0-2	BP00172, 173JE	—
	4725JE	30	7/6/94	Soil	0-2	BP00172, 173JE	—
	4726JE	30	7/6/94	Soil	0-2	BP00172, 173JE	—
	4733JE	30	7/8/94	Soil	2.2-14.8	—	BH00133,34, 141-43, 151-54JE
	4738JE	30	7/8/94	Soil	18-39.1	—	BH00144-48, 55-59JE
	4740JE	30	7/11/94	Soil	2.2-52.2	—	BH00133, 134, 141-49, 151-62JE
	4741JE	30	7/8/94	Soil	42-44.6	—	BH00149, 160JE
	4742JE	30	7/11/94	Soil	2.2-52.2	—	BH00133, 134, 141-49, 151-62JE
10294	4727JE	30	7/7/94	Soil	0-2	BP00166JE	—
	4728JE	30	7/7/94	Soil	0-2	BP00166JE	—
	4732JE	30	7/7/94	Soil	0-2	BP00166JE	—
	4739JE	30	7/12/94	Soil	3.8-15.9	—	BH00164-169JE
	4743JE	30	7/12/94	Soil	3.8-15.9	—	BH00164-169JE
10394	4772JE	30	7/28/94	Soil	0-2	BP00174JE	—
	4773JE	30	7/28/94	Soil	0-2	BP00174JE	—
	4774JE	30	7/28/94	Soil	0-2	BP00174JE	—
	4775JE	30	7/28/94	Soil	0-2	BP00174JE	—
	4792JE	30	8/4/94	Soil	2.4-10.7	—	BH00186-190JE



**TABLE 3**  
**1994 WELL ABANDONMENT AND REPLACEMENT PROGRAM**  
**DRUM CHARACTERIZATION SUMMARY**  
 Rocky Flats Environmental Technology Site

Site Number	Drum Number	Drum Size (gal)	Date Filled	Drum Contents	Drum Footage	Associated 'BP' Number	Associated 'BH' Number
10494	4501JE	30	6/13/94	Soil	2.1-10.4	—	BH00120,23-26JE
	4502JE	30	6/8/94	Soil	0-2	BP00154JE	—
	4503JE	30	6/8/94	Soil	0-2	BP00154JE	—
	4504JE	30	6/8/94	Soil	0-2	BP00154JE	—
	4505JE	30	6/8/94	Soil	0-2	BP00154JE	—
	4506JE	30	6/13/94	Soil	2.1-10.4	—	BH00120,23-26JE
	4507JE	30	6/14/94	Soil	2.1-10.4	—	BH00120,23-26JE
10594	4493JE	30	6/8/94	Soil	0-2	BP00153JE	—
	4495JE	30	6/8/94	Soil	0-2	BP00153JE	—
	4496JE	30	6/8/94	Soil	0-2	BP00153JE	—
	4497JE	30	6/8/94	Soil	0-2	BP00153JE	—
	4498JE	30	6/10/94	Soil	2.6-12.2	—	BH00118,119JE; BH00121,122JE
	4499JE	30	6/15/94	Soil	0-2	BP00156, 159JE	—
	4500JE	30	6/15/94	Soil	0-2	BP00156, 159JE	—
10694	4508JE	30	6/9/94	Soil	0-2	BP00155JE	—
	4509JE	30	6/9/94	Soil	0-2	BP00155JE	—
	4510JE	30	6/9/94	Soil	0-2	BP00155JE	—
	4511JE	30	6/9/94	Soil	0-2	BP00155JE	—
	4512JE	30	6/16/94	Soil	2.7-10.9	BP00170JE	BH00127-129JE

**TABLE 3**  
**1994 WELL ABANDONMENT AND REPLACEMENT PROGRAM**  
**DRUM CHARACTERIZATION SUMMARY**  
**Rocky Flats Environmental Technology Site**

Site Number	Drum Number	Drum Size (gal)	Date Filled	Drum Contents	Drum Footage	Associated 'BP' Number	Associated 'BH' Number
10794	4690JE	30	6/20/94	Soil	0-2	BP00158JE	—
	4691JE	30	6/20/94	Soil	0-2	BP00158JE	—
	4692JE	30	6/20/94	Soil	0-2	BP00158JE	—
	4693JE	30	6/27/94	Soil	2.4-8.4	—	BH00137-140JE
10894	4708JE	30	6/23/94	Soil	0-2	BP00165JE	—
	4709JE	30	7/15/94	Soil	4.3-8.1	—	BH00180-82, 85JE
	4710JE	30	6/23/94	Soil	0-2	BP00165JE	—
	4711JE	30	6/23/94	Soil	0-2	BP00165JE	—
	4712JE	30	6/23/94	Soil	0-2	BP00165JE	—
10994	4481JE	30	5/19/94	Soil	0-19.7	—	BH00101-110JE
11094	4480JE	30	5/20/94	Soil	0-8	—	BH00111-116JE
	4482JE	30	5/24/94	Soil	0-9.75	—	BH00111-116JE
11194	4751JE	30	7/8/94	Soil	0-2	BP00167JE	—
	4752JE	30	7/8/94	Soil	0-2	BP00167JE	—
	4753JE	30	7/8/94	Soil	0-2	BP00167JE	—
	4754JE	30	7/8/94	Soil	0-2	BP00167JE	—
	4761JE	30	7/20/94	Soil	3.2-9.0	—	BH00178, 79, 83JE

**TABLE 3**  
**1994 WELL ABANDONMENT AND REPLACEMENT PROGRAM**  
**DRUM CHARACTERIZATION SUMMARY**  
**Rocky Flats Environmental Technology Site**

Site Number	Drum Number	Drum Size (gal)	Date Filled	Drum Contents	Drum Footage	Associated 'BP' Number	Associated 'BH' Number
11894	4704JE	30	6/22/94	Soil	0-2	BP00164JE	—
	4703JE	30	6/22/94	Soil	0-2	BP00160JE	—
	4705JE	30	6/22/94	Soil	0-2	BP00160JE	—
	4707JE	30	6/22/94	Soil	0-2	BP00160JE	—
	4706JE	30	6/22/94	Soil	0-2	BP00160JE	—
	4749JE	30	7/14/94	Soil	3.7-16.5	—	BH00170-175JE
11994	4698JE	30	6/22/94	Soil	0-2	BP00163JE	—
	4699JE	30	6/22/94	Soil	0-2	BP00162JE	—
	4700JE	30	6/22/94	Soil	0-2	BP00162JE	—
	4701JE	30	6/22/94	Soil	0-2	BP00162JE	—
	4702JE	30	6/22/94	Soil	0-2	BP00162JE	—
	4750JE	30	7/14/94	Soil	3.5-8.4	—	BH00176, 177JE
12094	4513JE	30	6/16/94	Soil	0-2	BP00154JE	—
	4514JE	30	6/16/94	Soil	0-2	BP00154JE	—
	4515JE	30	6/16/94	Soil	0-2	BP00154JE	—
	4516JE	30	6/16/94	Soil	0-2	BP00154JE	—
	4517JE	30	6/16/94	Soil	0-2	BP00154JE	—
	4534JE	30	6/24/94	Soil	2.1-10.4	—	BH00120,23-26JE

**TABLE 3**  
**1994 WELL ABANDONMENT AND REPLACEMENT PROGRAM**  
**DRUM CHARACTERIZATION SUMMARY**  
**Rocky Flats Environmental Technology Site**

Site Number	Drum Number	Drum Size (gal)	Date Filled	Drum Contents	Drum Footage	Associated 'BP' Number	Associated 'BH' Number
52194	4694JE	30	7/1/94	Soil	0-13.2	BP00303JE	—
52294	4695JE	30	6/30/94	Soil	0-13	BP00302JE	—
52394	4530JE	30	6/30/94	Soil	0-30	BP00301JE	—
	4531JE	30	6/30/94	Soil	0-30	BP00301JE	—
	4532JE	30	6/30/94	Soil	0-30	BP00301JE	—
	4533JE	30	6/30/94	Soil	0-30	BP00301JE	—

**TABLE 4**  
**WELL INSTALLATION INFORMATION SUMMARY - FY94 WARP**  
**Rocky Flats Environmental Technology Site**

WELL NO.	COLORADO STATE COORDS		GROUND SURFACE ELEVATION (ft)	TOC ELEVATION (ft)	ZONE OF COMPLETION	CASING MATERIAL	CSG ID (in)	SPECIALIZED SURFACE CASING MATERIAL	CSG ID (in)	DRILL METHOD	TOTAL DEPTH BGS (ft)	STICK UP (ft)	SCREENED INTERVAL	DRILL DATES		DEPTH TO WATER FROM TOC (ft)	WELL DEVELOPED (YES/NO)	DEPTH TO BEDROCK (ft) bgs
	NORTH	EAST												START	END			
WARP WELLS																		
10094	743067	2091932	5683.7	5686.73	ALLUVIUM	PVC	2	Sch.80 PVC	12	HSA	8.40	1.80	4.1-6.1	08/03/94	08/03/94	9.12	NO	6.10
10194	749121	2088284	5938.3	5940.38	ALLUVIUM	PVC	2	STEEL	18	HSA	43.20	2.10	30.8-40.8	07/08/94	07/11/94	39.33	NO	40.80
10294	742319	2093891	5623.8	5625.93	ALLUVIUM	PVC	2	STEEL	18	HSA	17.00	2.20	4.6-14.6	07/12/94	07/12/94	7.19	YES	14.60
10394	744947	2093664	5650.4	5653.13	ALLUVIUM	PVC	2	STEEL	18	HSA	10.50	2.00	3.2-8.2	08/04/94	08/04/94	10.51	NO	8.20
10594	752124	2086746	5818	5820.95	ALLUVIUM	PVC	2	Sch.80 PVC	12	HSA	10.50	2.95	4.5-7.9	08/10/94	08/10/94	10.64	NO	7.90
10694	752659	2088757	5757.3	5780.23	ALLUVIUM	PVC	2	Sch.80 PVC	12	HSA	8.00	3.00	3.7-5.7	08/16/94	08/16/94	6.26	NO	5.70
10794	753735	2090880	5695.9	5698.51	ALLUVIUM	PVC	2	STEEL	18	HSA	6.80	2.80	2.5-4.5	08/27/94	08/27/94	6.80	NO	4.50
10894	753948	2092348	5688.8	5688.91	ALLUVIUM	PVC	2	STEEL	18	HSA	10.20	1.80	3.0-8.0	07/15/94	07/15/94	7.23	YES	4.70
10994	747431	2083266	5915.4	5917.48	ALLUVIUM	PVC	2	N/A	N/A	HSA	19.70	2.00	12.2-17.2	05/19/94	05/19/94	16.72	YES	18.00
11094	747260	2082927	5909.9	5912.03	ALLUVIUM	PVC	2	N/A	N/A	HSA	9.70	2.17	2.4-8.75	05/20/94	05/20/94	9.36	NO	6.50
11294	749435	2074305	6171.4	6173.50	ALLUVIUM	PVC	2	N/A	N/A	ODEX®	78.50	2.30	61.2-76.2	07/13/94	07/22/94	22.42	YES	75.80
11394	747847	2078297	6144.3	6146.48	ALLUVIUM	PVC	2	N/A	N/A	ODEX®	75.30	2.00	53.0-73.0	08/20/94	08/23/94	DRY	NO	73.00
11494	748148	2074267	6184.6	6186.63	ALLUVIUM	PVC	2	N/A	N/A	ODEX®	69.50	1.89	52.0-67.0	08/28/94	08/30/94	20.70	YES	69.00
11594	751804	2075708	6113.6	6115.58	ALLUVIUM	PVC	2	N/A	N/A	ODEX®	69.50	2.00	43.6-63.6	07/08/94	07/12/94	63.50	NO	61.00
12094	753880	2088529	5780	5783.07	ALLUVIUM	PVC	2	STEEL	18	HSA	12.00	2.60	5.6-10	08/24/94	08/24/94	10.65	YES	10.00
TEST WELLS																		
11894	755770	2085008	5945.2	5947.68	ALLUVIUM	PVC	2 1/4	N/A	N/A	HSA	30.20	2.50	7.5-27.5	08/23/94	08/28/94	21.01	YES	27.30
11794	755760	2085007	5948.5	5948.06	ALLUVIUM	PVC	2	N/A	N/A	HSA	30.00	2.50	7.5-27.5	08/28/94	08/28/94	21.00	YES	27.30
OFF-SITE WELLS																		
11894	752860	2095268	5613.1	5615.35	ALLUVIUM	PVC	2	STEEL	18	HSA	17.00	2.00	4.3-14.3	07/14/94	07/14/94	13.38	NO	4.80
11994	753278	2094759	5625.3	5627.54	ALLUVIUM	PVC	2	STEEL	18	HSA	8.20	2.10	4.0-6.0	07/14/94	07/14/94	6.74	NO	5.30
GEOTECHNICAL BOREHOLES																		
52194	749375	2084793	5978.7	N/A	N/A	N/A	N/A	N/A	N/A	HSA	13.20	N/A	N/A	07/01/94	07/01/94	N/A	N/A	4.50
52294	749008	2084904	5981.9	N/A	N/A	N/A	N/A	N/A	N/A	HSA	13.00	N/A	N/A	08/30/94	08/30/94	N/A	N/A	7.50
52394	748871	2084769	5987.8	N/A	N/A	N/A	N/A	N/A	N/A	HSA	30.00	N/A	N/A	08/28/94	08/30/94	N/A	N/A	6.00
SEP BOREHOLES																		
69194	754135	2084831	5956.3	N/A	N/A	N/A	N/A	N/A	N/A	AIR ROT.	185.00	N/A	N/A	09/18/94	09/21/94	DRY	N/A	13.00
69294	754053	2084879	5952.7	N/A	N/A	N/A	N/A	N/A	N/A	AIR ROT.	240.00	N/A	N/A	09/18/94	09/21/94	54.60*	N/A	12.00
69394	753985	2085132	5948.3	N/A	N/A	N/A	N/A	N/A	N/A	AIR ROT.	240.00	N/A	N/A	09/20/94	09/22/94	101.50*	N/A	7.50
69494	754164	2084768	5954.4	N/A	N/A	N/A	N/A	N/A	N/A	AIR ROT.	230.00	N/A	N/A	09/26/94	09/26/94	12.20*	N/A	13.50
69594	754112	2084532	5958.1	N/A	N/A	N/A	N/A	N/A	N/A	AIR ROT.	170.00	N/A	N/A	09/23/94	09/28/94	DRY	N/A	14.50
69694	754095	2084989	5951.2	N/A	N/A	N/A	N/A	N/A	N/A	AIR ROT.	230.00	N/A	N/A	09/27/94	09/28/94	10.25*	N/A	13.00
ABANDONED BOREHOLES																		
10494	753888	2088538	5759.6	N/A	N/A	N/A	N/A	Sch.80 PVC	12	HSA	10.40	N/A	N/A	08/13/94	08/13/94	N/A	N/A	7.40
11194	743082	2091944	5685.7	N/A	N/A	N/A	N/A	STEEL	18	HSA	9.00	N/A	N/A	07/20/94	07/20/94	N/A	N/A	NP
RISER EXTENSIONS																		
72093	752550	2083206	5988.8	6002.77	alluvium	PVC	2	N/A	N/A	HSA	52.10	13.97	44.9-49.9	08/12/94*	08/12/94*	ND	yes	49.9
72393	752552	2083196	5992.1	6001.83	alluvium	PVC	2	N/A	N/A	HSA	39.00	9.73	26.6-36.6	08/15/94*	08/15/94*	ND	yes	NP

See Appendix D for exact coordinate data.

**Notes:**

AIR ROT. = air rotary  
bgs = below ground surface  
CSG = casing  
ft = feet  
HSA = hollow-stem auger  
ID = inside diameter  
in = inches

N/A = not applicable  
ND = not determined  
NP = not penetrated  
PVC = polyvinyl chloride  
TOC = top of casing  
# = dates the riser extensions were added  
\* = measured below ground surface

**TABLE 5**  
**1994 WARP SPECIAL BORING INFORMATION SUMMARY**  
**Rocky Flats Environmental Technology Site**

Borehole Number	Colorado State Coordinates		Ground Surface Elevation (feet)	Location	Depth to Bedrock bgs (feet)	Date Surface Casing Set	Depth of Surface Casing bgs (feet)	Diameter of Surface Casing (inches)	Type of Surface Casing	Total Depth of Bore Hole	Date Total Depth Reached	Total GP Logged Depth bgs (feet)	Date Logged	GP Logging Company	Abandonment Method	Abandonment Date
	North	East														
GEOTECHNICAL BOREHOLES																
52194	749375	2084792	5978.6	Yard	4.50	NA	NA	NA	NA	13.20	07/01/94	NA	NA	NA	Grout in place	07/01/94
52294	749008	2084904	5982.3	Yard	8.00	NA	NA	NA	NA	13.00	08/30/94	NA	NA	NA	Grout in place	08/30/94
52394	748671	2084769	5987.6	Yard	6.00	NA	NA	NA	NA	30.00	06/29/94	NA	NA	NA	Grout in place	07/01/94
SEP BOREHOLES																
69194	754135	2084631	5956.3	N.BZ	13.00	9/16/94	20.00	6.00	80 PVC	185.00	09/21/94	180.00	09/21/94	Century	Grout in place	09/22/94
69294	754053	2084878	5952.7	N.BZ	12.00	9/19/94	19.00	6.00	80 PVC	240.00	09/21/94	235.00	09/21/94	Century	Grout in place	09/30/94
69394	753985	2085132	5948.3	N.BZ	7.50	9/20/94	19.00	6.00	80 PVC	240.00	09/22/94	235.00	09/22/94	Century	Grout in place	09/29/94
69494	754164	2084768	5954.4	N.BZ	13.50	9/23/94	20.00	6.00	80 PVC	230.00	09/26/94	220.00	09/27/94	Century	Grout in place	10/03/94
69594	754112	2084531	5958.1	N.BZ	14.50	9/23/94	20.00	6.00	80 PVC	170.00	09/26/94	165.00	09/26/94	Century	Grout in place	09/28/94
69694	754095	2084989	5951.2	N.BZ	13.00	9/27/94	20.00	6.00	80 PVC	230.00	09/28/94	225.00	09/28/94	Century	Grout in place	09/29/94

See Appendix D for exact coordinate data.

bgs = below ground surface  
GP = geophysical  
NA = not applicable  
N.BZ = north buffer Zone  
PVC = Polyvinyl Chloride

True State Plane Coordinates  
(North American Datum, NAD 27)

TABLE 6  
1994 WARP VIDEO LOGGING DATA  
Rocky Flats Environmental Technology Site

Well No.	Date	Footage Taped	Depth to Water (feet)	Slot/Screen Interval (feet)	Total Depth (feet)	Observations	Recommendations
5074	08/29/94	11	Dry	1,3,6,8,7	13.75	Hand cut slots	Abandonment
5174	08/29/94	11	8.95	1,3,5-6,8,10	13.85 btoc	Hand cut slots	Abandonment
5274	08/29/94	6	6.78	0-7.35	7.35	Perforations every 4 in.	Abandonment
5374	08/05/94	16	19.45 btoc	3,5,7,9,11,13	19.7	Hand cut slots	Abandonment
5474	08/05/94	16	11.57 btoc	4,6,8,10,12,14,15	20.09 btoc	Hand cut slots	Abandonment
5574	08/05/94	31	Dry	9,14,19,24,30	33.04 btoc	Hand cut slots	Abandonment
5674	08/05/94	15	Dry	0-17.6	17.6	Perforations every 4 in.	Abandonment
5774	08/05/94	14	Dry	4,5,6,8,10,12	15.65 btoc	Casing broken off just bgs, Hand cut slots	Abandonment
5874	08/05/94	17	17.65	5,7,9,11,13,15	19.98 btoc	Very dirty, hand cut slots	Abandonment
5974	08/05/94	12	13.53 btoc	2,4,7,9,11	13.99 btoc	Hand cut slots	Abandonment
6074	08/10/94	15	Dry	4,7,8,9,10,13	18.2 btoc	Hand cut slots	Abandonment
6174	08/10/94	15.5	Dry	4,5,7,9,11,12,5,15	18.4 btoc	Hand cut slots	Abandonment
6274	08/05/94	16	10.00 btoc	4,6,7,9,11,13,15	20.01 btoc	A little debris/dirt, Hand cut slots	Abandonment
6374	08/24/94	16	14.92	6,9,11,12,15	18.54 btoc	Water is clear, Hand cut slots	Abandonment
6474	08/05/94	28	18.27	14,17,19,21	30.63 btoc	Turbid water 26-28 ft, Hand cut slots	Abandonment
6574	08/05/94	27	11.74	13,17,20,23	29.4 btoc	Hand cut slots	Abandonment
6674	08/10/94	15	12.75	1,3,4,7,10,13	17.77 btoc	Hand cut slots	Abandonment
6774	08/24/94	58	39.7 btoc	3,6,12,15,20,21,25,29,35	58.74	High Turbidity prevented observations below water level	Abandonment
2087	08/29/94	113	100.00	107-113 ft	116	Screen in good condition, Hand cut slots	No action
5887	08/24/94	22	12.98 btoc	4-22 ft	25.35 btoc	Screen in good condition, Measured from inner casing	No action
7287	08/24/94	10	8.95 btoc	4.5-7 ft	10.45 btoc	Screen in good condition, Measured from outer casing	No action
B302989	08/03/94	9	5.00	3.5-8 ft	8.9	Screen in good condition, Trace roots in screen, clean	No action
B317189	08/24/94	49	Dry	60-75 ft	79.85 btoc	Obstruction at 49 ft, casing twisted from 43-48 ft	Abandonment
31791	08/24/94	14	14.30 btoc	7-14 ft	16.9 btoc	Screen in good condition, Very turbid	No action
35691	08/24/94	18	19.40 btoc	16-27 ft	30.45 btoc	Bend in well casing at 17 ft, measured from outer casing	Abandonment
24193	08/25/94	73	27.57 btoc	22-72 ft	77.45	Poor visibility	Abandonment
24393	08/25/94	72	26.4 btoc	22-72 ft	75.55 btoc	Abundant algae	Abandonment
24993	08/25/94	72	26.53 btoc	23-72 ft	71.55	Loose visibility at 67 ft	Abandonment

- Information was obtained from the logbook of Mark Wood 8/2/94 - 9/7/94.
- Recommendations made by Mark Wood (WARP designee).
- Camera measurements were made from ground surface.
- if stated, depths were measured below top of casing (btoc)
- If not stated, depths were measured from a point that was not noted in the logbook
- See Appendix D for coordinate data.

## INTEROFFICE CORRESPONDENCE

*file*  
#4986

DATE March 17, 1994  
TO T. P. O'Rourke, OU11 Manager, Bldg. 080, X8577, D5475  
FROM E. A. Keil, Envir. Coordinator ER-FOM, Bldg. 080, X8642, D4405  
SUBJECT EPA Waste Code Concurrence for OU-11 Drilling Program  
REF Phase I RFI/RI Health and Safety Plan OU-11

Due to finding number #93-WM-OOS-891-005-008 Improper Labeling of Hazardous Waste an Action Plan was implemented by Environmental Operations Management to correct this situation and hopefully provide guidance and satisfy all concerned.

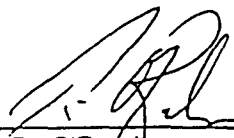
The responsibility for the determination of EPA Codes and Compatibility Codes for hazardous waste remains with the OU Manager, on behalf of EG&G Rocky Flats Inc. and operating under standard operating procedures and training provided and approved by EG&G Rocky Flats Inc., ER-EOM has determined, using your work plan, the possible hazardous waste that may be contained in the OU11 IDM.

The following are the hazardous waste constituents and EPA codes ER-EOM has determined may be in the OU11 drums of IDM:

Carbon Tetrachloride	F001
Chromium	D007
Trichloroethylene (TCE)	F001
Tetrachloroethylene (PCE)	F001
Beryllium	P015

If the above listed chemical constituents and EPA codes meet with your approval please sign below giving ER-EOM your concurrence. If you feel additional EPA codes need to be deleted or added please list them below and give ER-EOM references and documentation for the changes.

I concur with the above listed chemical constituents and EPA codes for the OU11 IDM drums.

  
\_\_\_\_\_  
T. P. O'Rourke  
OU11 Manager

CC: M. C. Broussard  
S. L. Myrick

*10/11/94, 1530*  
*Delete Beryllium P015*  
*from this list according*  
*to Mike Pepping.*



## INTEROFFICE CORRESPONDENCE

DATE April 7, 1994

TO T. P. Lovseth, WARP Manager, Bldg. 080, X8706, D5134  
FROM E. A. Keil, Envir. Coordinator ER-FOM, Bldg. 080, X8642, D4405

SUBJECT EPA Waste Code Concurrence for WARP-94 Drlg. Program

REF WARP-94 EPA Waste Code Concurrence ltr dated 4/6/94 (See attached)

Due to finding number #93-WM-OOS-891-005-008 Improper Labeling of Hazardous Waste an Action Plan was implemented by Facility Operations Management to correct this situation and hopefully provide guidance and satisfy all concerned.

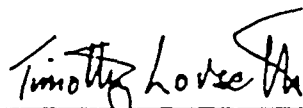
The responsibility for the determination of EPA Codes and Compatibility Codes for hazardous waste remains with the generator/Project Manager, on behalf of EG&G Rocky Flats Inc. and operating under standard operating procedures and training provided and approved by EG&G Rocky Flats Inc., ER-FOM has determined using your EPA waste code concurrence the possible hazardous waste that may be contained in the WARP-94 IDM.

The following are the hazardous waste constituents and EPA codes ER-FOM has determined may be in the WARP-94 drums of IDM:

Carbon Tetrachloride (CCI 4)	F001
Trichloroethylene (TCE)	F001
Tetrachloroethylene (PCE)	F001
Acetone	F003
Toluene	F005
Lead (Pb)	D008
Chromium (Cr)	D007
Barium (Ba)	D005
Cadmium (Cd)	D006
Mercury (Hg)	D009
Arsenic (As)	D004

If the above listed chemical constituents and EPA codes meet with your approval please sign below giving ER-FOM your concurrence. If you feel additional EPA codes need to be deleted or added please list them below and give ER-FOM references and documentation for the changes.

I concur with the above listed chemical constituents and EPA codes as defined in our preliminary waste characterization dated 4/6/94 on a well by well basis for the WARP-94 IDM drums.



T. P. Lovseth  
WARP-94 Project Manager

CC: M. C. Broussard  
S. L. Myrick

# MEMORANDUM

TO: E.A. Keil, Env. Coordinator ER-FOM, Bldg. 080, X8642

FROM: M.R. Wood, ES&E/Geosciences, Bldg. 080, X8784 *M.R. Wood*  
T.P. Lovseth, ES&E/Geosciences, Bldg. 080, X8706 *T.P. Lovseth*

DATE: April 6, 1994

SUBJECT: EPA Waste Code Concurrence for WARP FY94

As part of the Readiness Review process we have prepared two tables outlining the applicable EPA waste codes for drums generated during WARP FY94 field activities. One table pertains to drums generated during well abandonment activities and the second table pertains to new well installations activities. Due to the plant wide scope of the WARP FY94 field activities the potential contaminants of concern were based on most probable Operable Unit (OU) contaminants to be encountered per well location. Site specific waste characterization will be performed in accordance with the appropriate SOPs and the target analytes for laboratory analysis will be OU specific.

WARP FY94  
NEW WELL INSTALLATION PRELIMINARY WASTE CHARACTERIZATION

Well Number	Replacement Well or area of Placement	OU Reference	Waste Characterization Potential Contaminants of Concern	Waste Characterization Applicable EPA Codes
10094	4087	OU7	toluene, acetone, TCE, Pb	F005, F003, F001, D008
10194	SOUTH OF OU2	OU2	CCl4, PCE, TCE, Ba	F001, D007, D004, D006, D005
10294	B303089	OU5	CCl4, PCE, TCE, Pb, Cr	F001, F001, F001, D008, D007
10394	41491	OU5	CCl4, PCE, TCE, Pb, Cr	F001, F001, F001, D008, D007
10494	NO NAME GULCH	OU6	acetone, Pb, Hg	F003, D009, D008
10594	EAST OF POND A-1	OU6	acetone, Pb, Hg	F003, D009, D008
10694	EAST OF POND A-3	OU6	acetone, Pb, Hg	F003, D009, D008
10794	WALNUT CREEK	OU6	acetone, Pb, Hg	F003, D009, D008
10894	WALNUT CREEK	OU6	acetone, Pb, Hg	F003, D009, D008
10994	881 HILLSIDE	OU5	CCl4, PCE, TCE, Pb, Cr	F001, F001, F001, D008, D007
11094	881 HILLSIDE	OU5	CCl4, PCE, TCE, Pb, Cr	F001, F001, F001, D008, D007
11194	WEST OF POND D-2	SITEWIDE	field screen in accordance with FO.23 - landfill	Not Applicable
11294	WEST OF OU11	OU11	field screen in accordance with FO.23 - landfill	Not Applicable
11394	WEST OF OU11	OU11	field screen in accordance with FO.23 - landfill	Not Applicable
11494	WEST OF OU11	SITEWIDE	field screen in accordance with FO.23 - landfill	Not Applicable
11594	UPPER ROCK CREEK	SITEWIDE	field screen in accordance with FO.23 - landfill	Not Applicable

Revision: April 6, 1994 WARP FY94 - WELL ABANDONMENT WASTE CHARACTERIZATION

Well No.	Abandonment Method	OU-IISS No.	Building or Area	Waste Characterization Potential Contaminants of Concern In Soil	Waste Characterization Applicable EPA Codes
015	Pull	OU4-101	N of Pond 207	PCE, Cr, As, Cd, Ba	F001, D007, D004, D006, D005
025	Pull	OU10-Adj 214	South of 980	CCl4, Cr, TCE, PCE, Cd	F001, D007, F001, F001, D006
035	Pull	OU10-Adj 214	South of 980	CCl4, Cr, TCE, PCE, Cd	F001, D007, F001, F001, D006
5070	CSG Destruct	OU9-Adj 124	East of 774	CCl4, Cr, TCE, PCE	F001, D007, F001, F001
5170	Abdn in Place	OU8-118.1	North of 776	CCl4, Cr, TCE, PCE	F001, D007, F001, F001
5270	Abdn in Place	OU8-118.1	North of 776	CCl4, Cr, TCE, PCE	F001, D007, F001, F001
5570	CSG Destruct	Sitewide	South of 980	uncontaminated surface area inside PA (AAC)	*
5670	Pull	OU8-Adj 118.1	West of 701	CCl4, Cr, TCE, PCE	F001, D007, F001, F001
5071	Abdn in Place	OU13-Adj 122	South of 441	CCl4, Cr, TCE, PCE	F001, D007, F001, F001
5171	Pull	OU8-Adj 150.4	East of 707	CCl4, Cr, TCE, PCE	F001, D007, F001, F001
5271	Abdn in Place	OU9-124	East of 774	CCl4, Cr, TCE, PCE	F001, D007, F001, F001
5671	Abdn in Place	OU9-122	SE of 122	CCl4, Cr, TCE, PCE	F001, D007, F001, F001
5771	Abdn in Place	PCB/RAID Area	East of 779	PCBs, plutonium	**
5871	Abdn in Place	OU4-Adj 150.8	East of 779	PCE, Cr, As, Cd, Ba	F001, D007, D004, D006, D005
5971	Abdn in Place	OU15-Adj 179	North of 865	CCl4, Cr, TCE, PCE	F001, D007, F001, F001
6071	Abdn in Place	OU15-Adj 179	West of 865	CCl4, Cr, TCE, PCE	F001, D007, F001, F001
6271	Abdn in Place	OU14-Adj 162	West of 889	CCl4, Cr, TCE, PCE	F001, D007, F001, F001
0188	Abdn in Place	OU8-172	West PA	CCl4, Cr, TCE, PCE	F001, D007, F001, F001
0288	Abdn in Place	OU8-172	West PA	CCl4, Cr, TCE, PCE	F001, D007, F001, F001
0388	Abdn in Place	OU9-121	West of 707	CCl4, Cr, TCE, PCE	F001, D007, F001, F001
0488	Abdn in Place	Sitewide	West PA	CCl4, Cr, TCE, PCE	F001, D007, F001, F001
0588	Abdn in Place	OU8-Adj 123.1	South PA	CCl4, Cr, TCE, PCE	F001, D007, F001, F001
0688	Abdn in Place	Sitewide	South PA	CCl4, Cr, TCE, PCE	F001, D007, F001, F001
0788	Abdn in Place	OU9-Adj 121	East of PA	CCl4, Cr, TCE, PCE	F001, D007, F001, F001
0888	Abdn in Place	OU9-121	North of 444	CCl4, Cr, TCE, PCE	F001, D007, F001, F001
0988	Abdn in Place	OU13-Adj 117.3	7th Street	CCl4, Cr, TCE, PCE	F001, D007, F001, F001
1088	Abdn in Place	Sitewide	SE of 707	CCl4, Cr, TCE, PCE	F001, D007, F001, F001

Note: \* Field screen in accordance with FO.23, if clean spread on ground

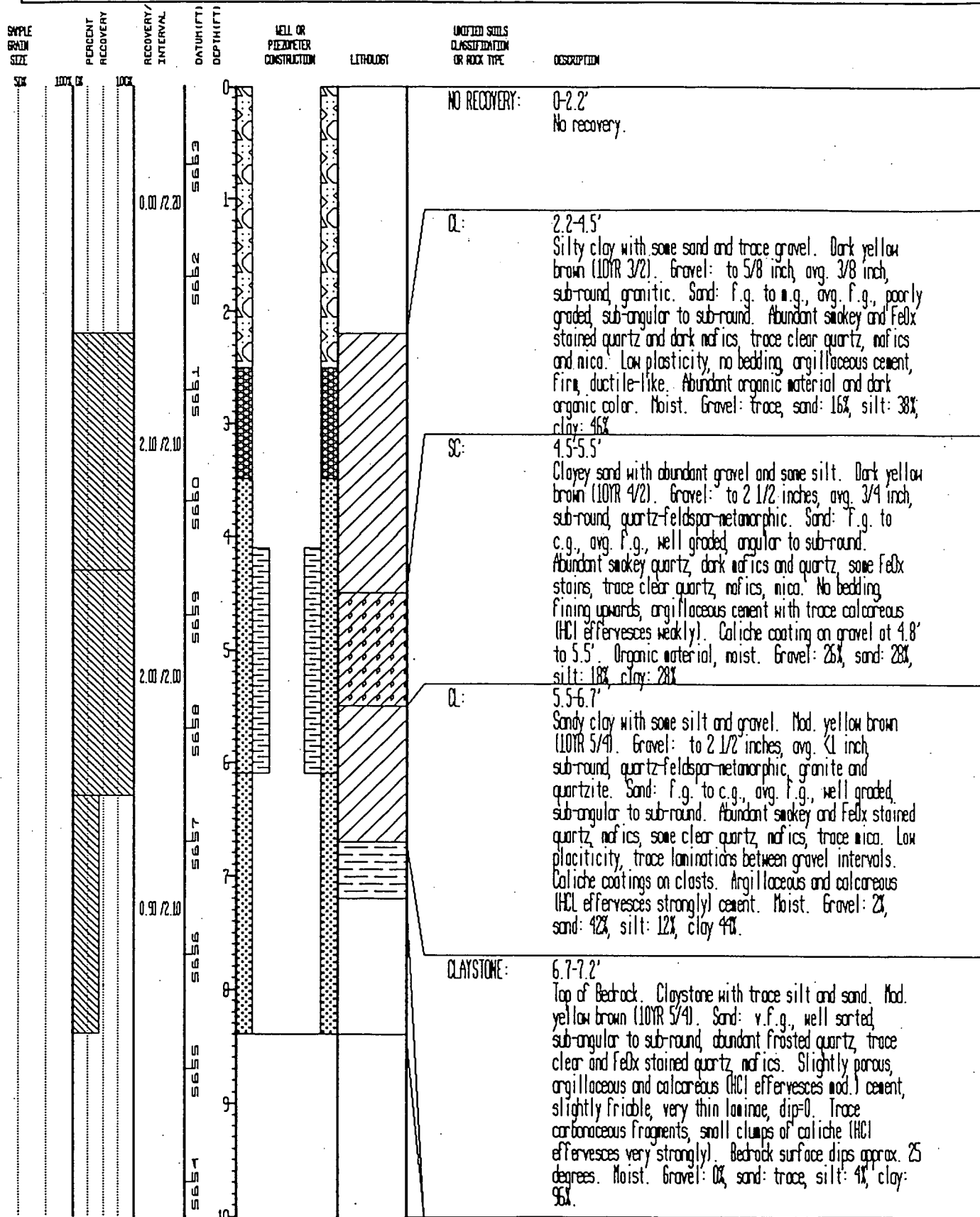
\*\* Will collect soil sample for waste characterization prior to abandonment

## APPENDIX B

### LITHOLOGIC BOREHOLE LOGS

<u>Borehole Number</u>	<u>Total Depth(feet)</u>	<u>Number of Pages</u>
10094	8.40	1
10194	52.20	6
10294	17.00	2
10394	10.70	2
10494	10.40	2
10594	12.10	2
10694	10.90	2
10794	8.40	1
10894	10.20	2
10994	19.70	2
11094	9.70	1
11194	9.00	1
11294	78.50	8
11394	75.30	8
11494	69.50	7
11594	65.90	7
11694	30.20	4
11794	30.00	3
11894	17.00	2
11994	8.40	1
52194	13.20	2
52294	13.00	2
52394	30.00	3
69194	185.00	19
69294	240.00	24
69394	240.00	24
69494	230.00	23
69594	170.00	17
69694	230.00	23

STATE PLANE COORDINATE: NORTH: 743067 EAST: 2091932  
 TOTAL DEPTH (FT): 8.40 AREA: D-SERIES POND LOCATOR NUMBER: 0  
 GROUND ELEVATION (FT): 5663.70 CASING DIAMETER (IN): 2.00 BOREHOLE DIAMETER (IN): 6.00  
 PROJECT NUMBER: WRP GEOLOGIST: K.R. MOTOSHI DATE DRILLED: 08/03/94  
 LOG OF BORE NUMBER: 10094  
 REMARKS: HOLLOWSTEN AUGER, K.R. MOTOSHI/A.G. WILCINSKI NOTE: WELL 10094 REPLACES WELL 11194.



STATE PLANE COORDINATE:  
NORTH: 749121 AREA: SE BUFFER ZONE  
EAST: 2088293 LOCATOR NUMBER: 0  
REMARKS: HOLLOWSTEN AUGER, K.R. MIYOSHI/J.C. WRIGHT

GROUND ELEVATION (FT): 5938.30  
CASING DIAMETER (IN): 2.00  
BOREHOLE DIAMETER (IN): 6.00

PROJECT NUMBER: WAPP  
GEOLOGIST: K.R. MIYOSHI  
DATE DRILLED: 07/08/94

LOG OF BORING NUMBER:

10194

DEPTH (FT) 0 1 2 3 4 5 6 7 8 9 10  
RECOVERY INTERVAL  
PERCENT RECOVERY  
SAMPLE GRAIN SIZE  
WELL OR  
PIEZOMETER  
CONSTRUCTION  
LITHOLOGY  
UNITED STATES  
CLASSIFICATION  
OR ROCK TYPE  
DESCRIPTION

NO RECOVERY:  
0-2.2'  
Surface casing, no core collected.

SM:  
2.2-8.2'  
Gravelly sand with some silt and trace clay. Mod. reddish brown (10YR 4/6). Gravel: commonly >2", avg. 1.5", sub-angular to sub-round. Composition is dominantly gray quartzite with subord. and metamorphic lithologies and red sandstone. Sand is sub-angular to sub-round with similar composition as gravel. Noncalcareous, argillaceous cement. Moist. Note: gravel content may be underestimated due to large size of clasts. Well graded. Gravel: 41%, sand: 49%, silt: 6%, clay: 4%.

SU:  
8.2-14'  
Sand with some gravel and silt, and trace clay. Mod. reddish brown (10YR 4/6). Gravel: max. size is >2", avg. approx. 1/2". Composition dominantly quartzose with <20% mafic clasts and sandstone. Sub-angular. Sand is dominantly m. g. and quartzose, sub-angular. Noncalcareous, moist, well graded. Gravel: 20%, sand: 71%, silt: 6%, clay 3%.

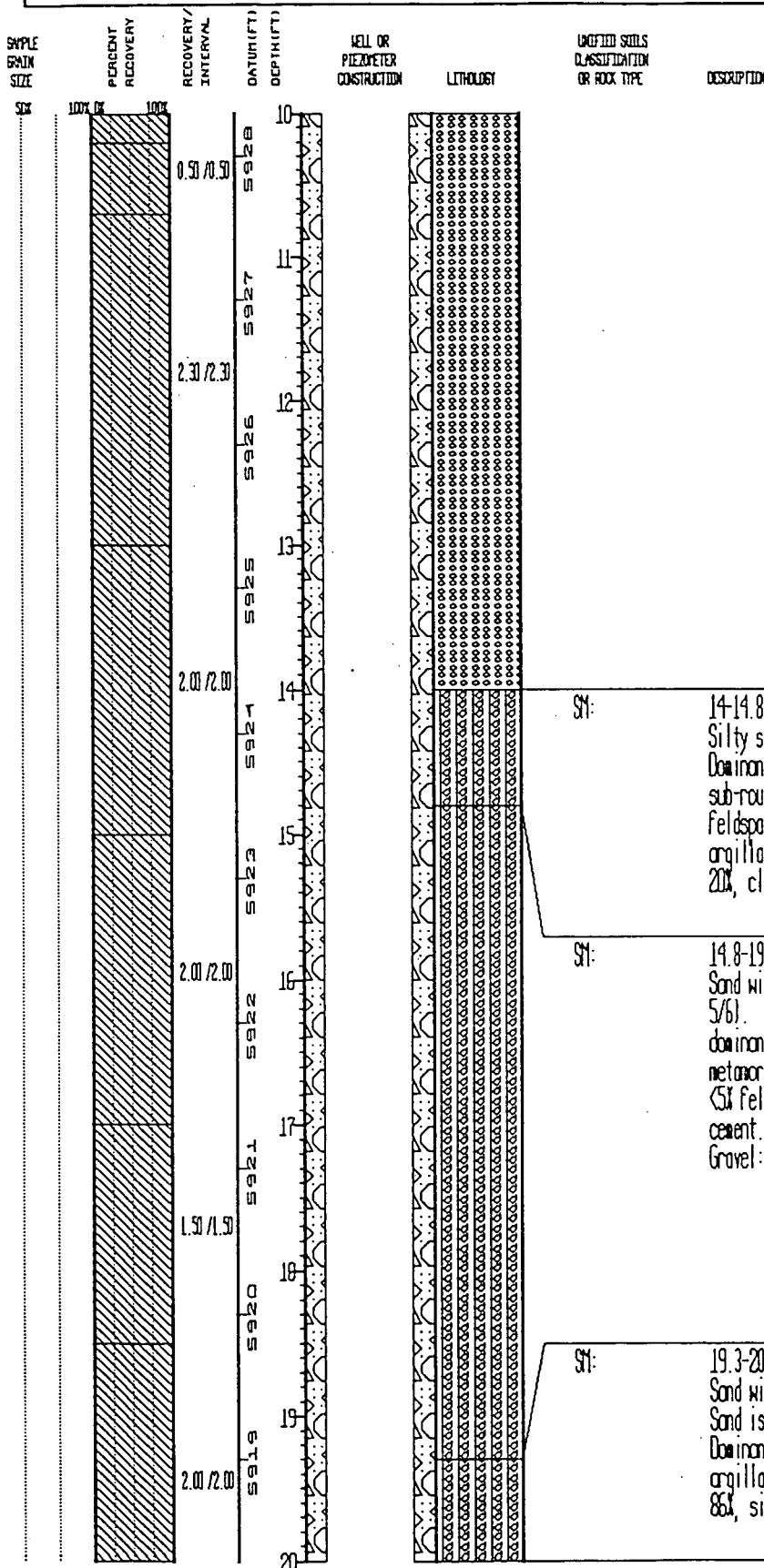
STATE PLANE COORDINATE: TOTAL DEPTH (FT): 52.20  
NORTH: 749121 AREA: SE BUFFER ZONE  
EAST: 2088283 LOCATOR NUMBER: 0  
REMARKS: HOLLOWSTEN AUGER, K.R. MIYOSHI/J.C. WRIGHT

GROUND ELEVATION (FT): 5538.30  
CASING DIAMETER (IN): 2.00  
BOREHOLE DIAMETER (IN): 6.00

PROJECT NUMBER: WPP  
GEOLOGIST: K.R. MIYOSHI  
DATE DRILLED: 07/08/94

LOG OF BOREHOLE NUMBER:

10194





STATE PLANE COORDINATE:  
NORTH: 749321  
EAST: 2088283  
REMARKS: HOLLOWSTERN AUGER, K.R. MIYOSHI/J.C. WRIGHT

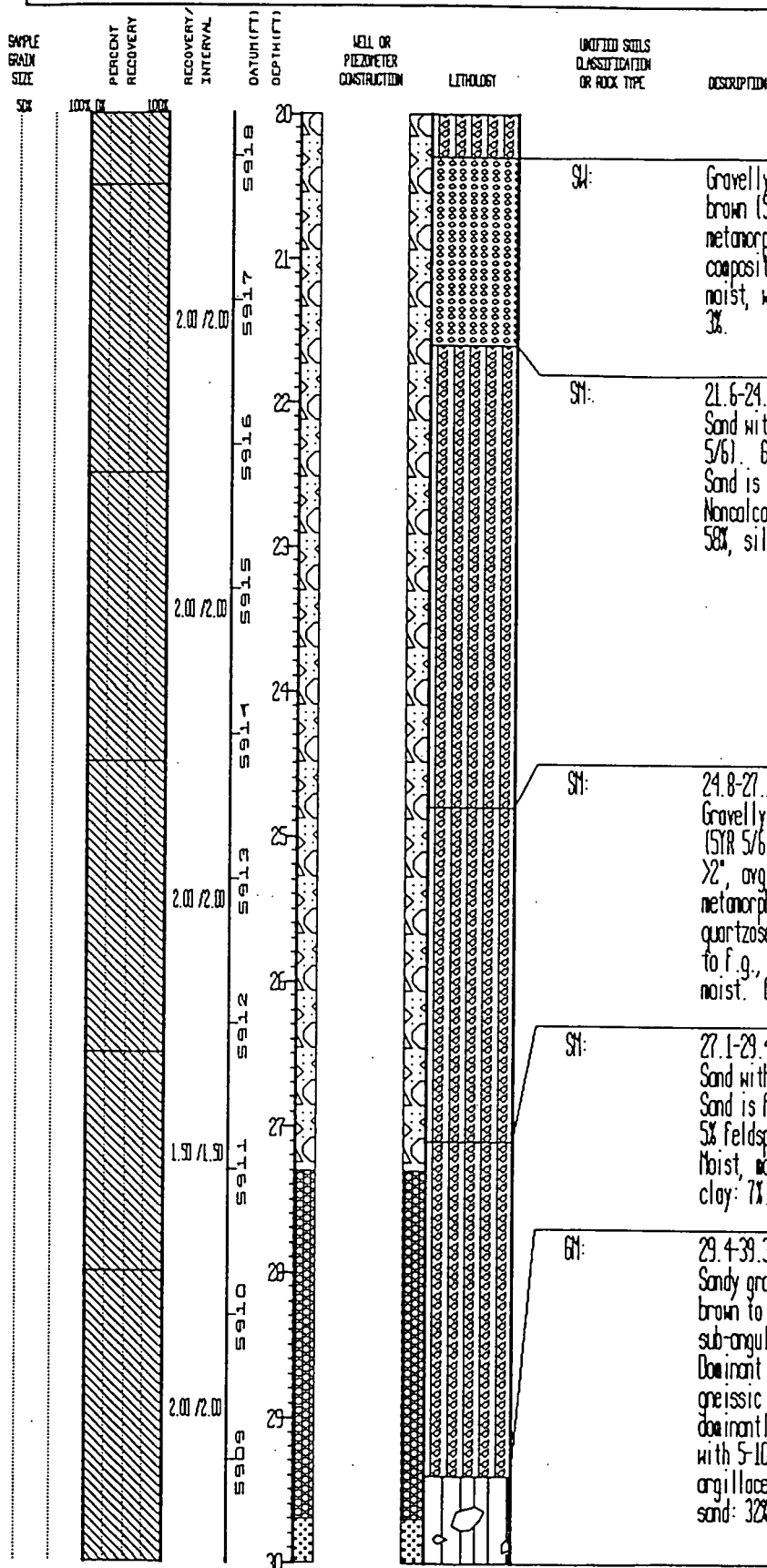
TOTAL DEPTH (FT): 52.20  
AREA: SE BUFFER ZONE  
LOCATOR NUMBER: 0

GROUND ELEVATION (FT): 5938.30  
CASING DIAMETER (IN): 2.00  
BOREHOLE DIAMETER (IN): 6.00

PROJECT NUMBER: WAPP  
GEOLOGIST: K.R. MIYOSHI  
DATE DRILLED: 07/08/94

LOG OF BORING NUMBER:

10194

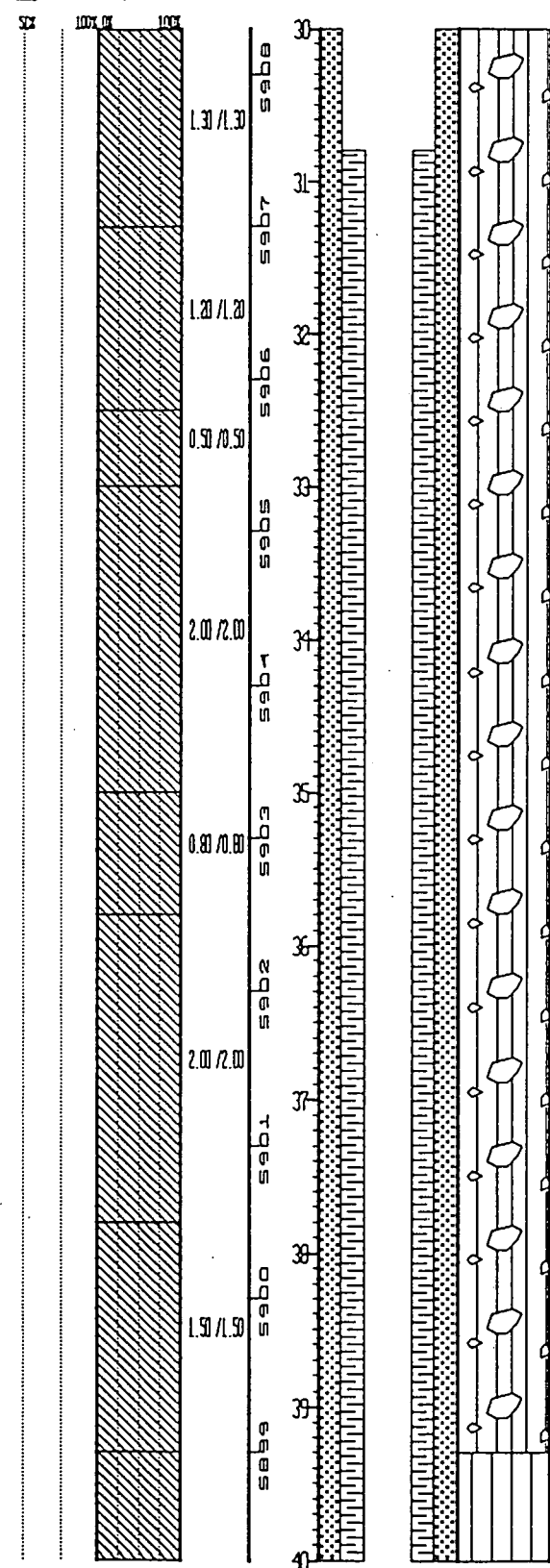


STATE PLANE COORDINATE: TOTAL DEPTH (FT): 52.20 GROUND ELEVATION (FT): 5538.30 PROJECT NUMBER: WAPP LOG OF BORING NUMBER: 10194  
 NORTH: 749121 AREA: SE BUFFER ZONE CASING DIAMETER (IN): 2.00 GEOLOGIST: K.R. MIYOSHI  
 EAST: 2088233 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 07/08/94  
 REMARKS: HOLLOWSTON AUGER, K.R. MIYOSHI/J.C. WRIGHT

WELL OR  
PIEZOMETER  
CONSTRUCTION

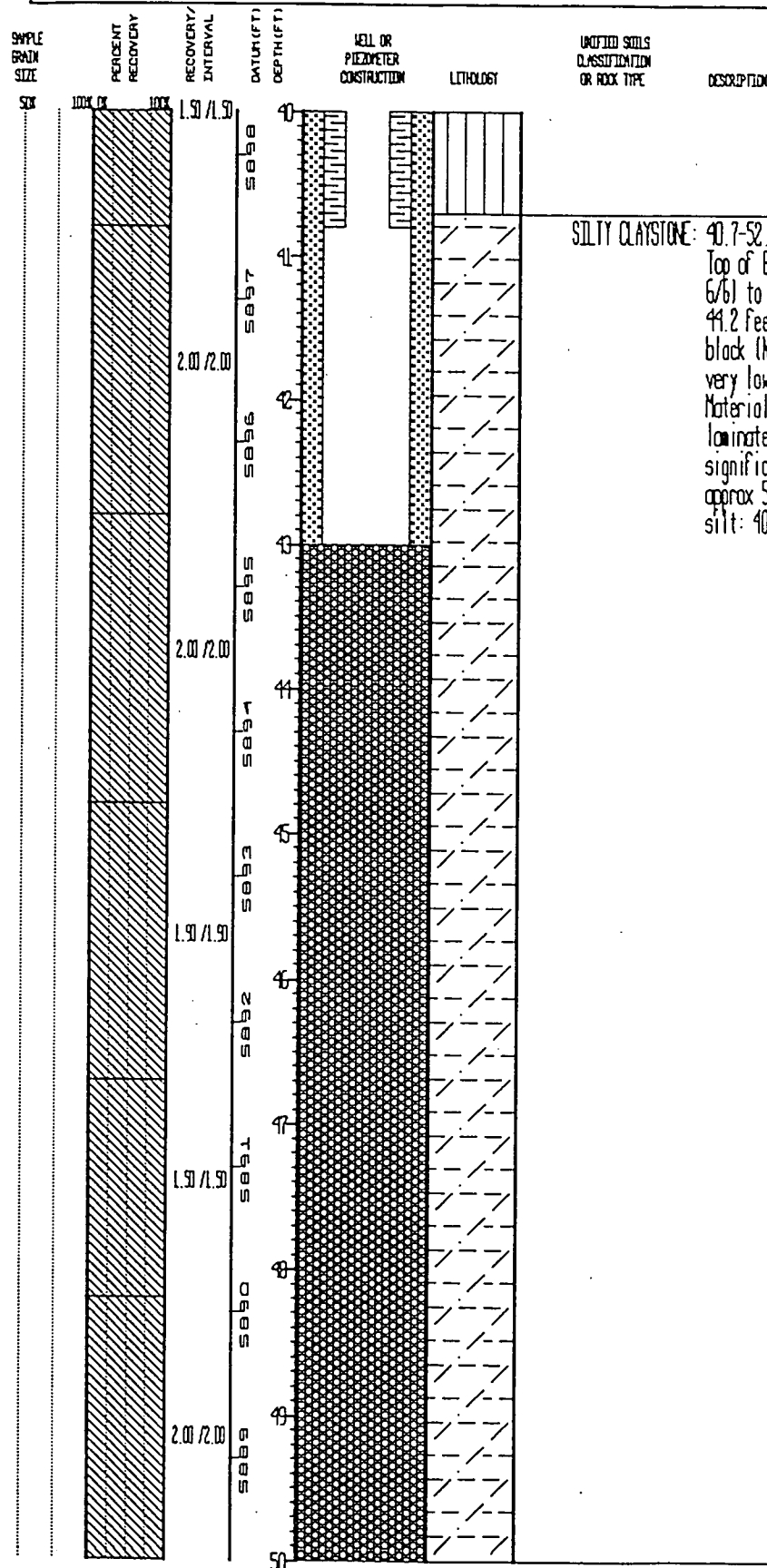
UNSATURATED  
SOILS  
CLASSIFICATION  
OR ROCK TYPE

DESCRIPTION

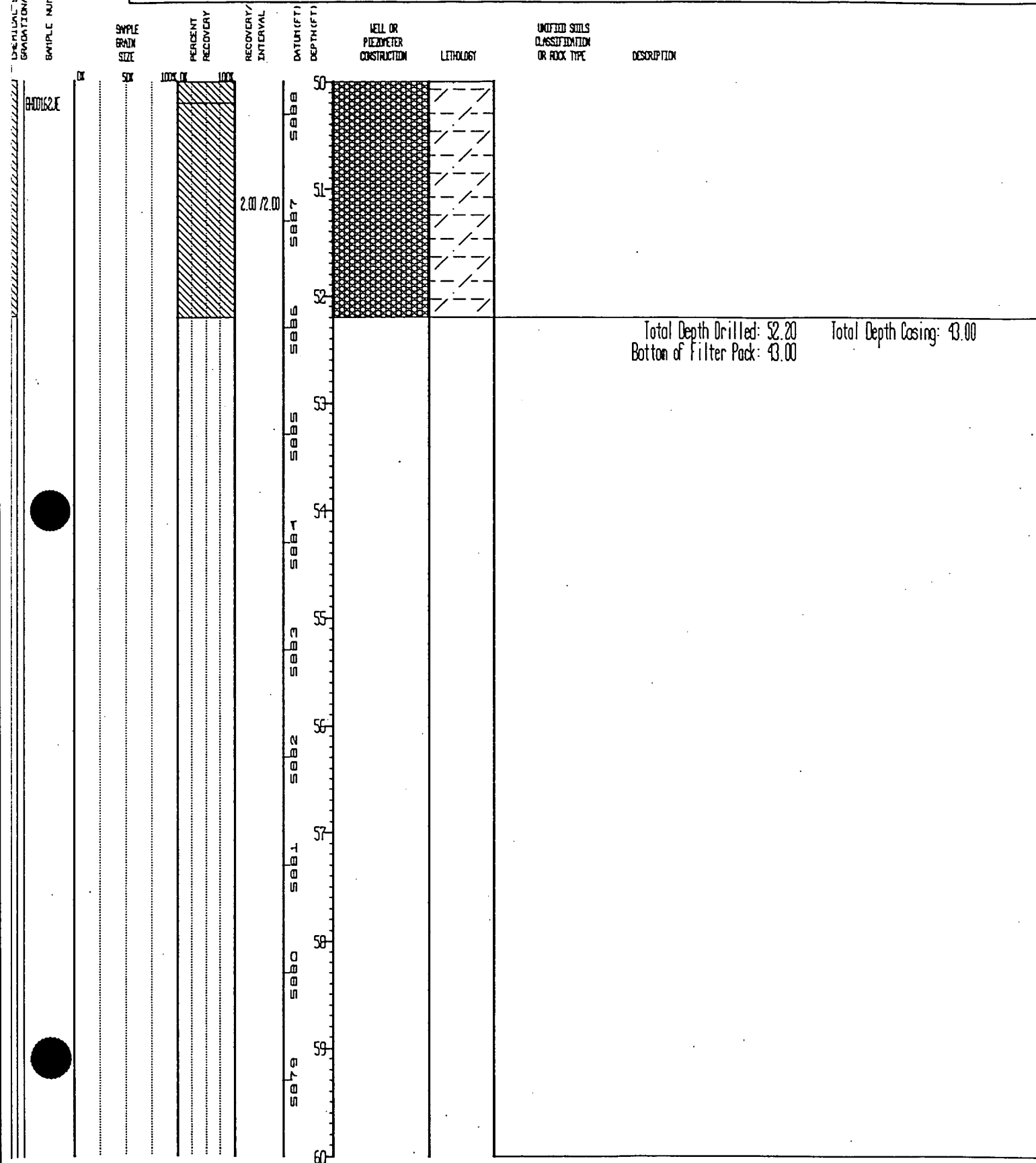


ML: 39.3-40.7'  
 Clayey silt with some sand and trace gravel. Mod. yellow brown (10YR 5/4). Sand is sub-angular and quartzose with 7% dark mineral grains, dominantly f.g., noncalcareous, argillaceous cement. Low plasticity, moist, poorly graded. Gravel: 1%, sand: 33%, silt: 33%, clay: 33%.

STATE PLANE COORDINATE: TOTAL DEPTH (FT): 52.20 GROUND ELEVATION (FT): 5538.30 PROJECT NUMBER: WRP LOG OF BORING NUMBER: 10194  
 NORTH: 749121 AREA: SE BUFFER ZONE CASING DIAMETER (IN): 2.00 GEOLOGIST: K.R. KOTOSHI  
 EAST: 2088293 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 07/08/94  
 REMARKS: HOLLOWSTEN AUGER, K.R. KOTOSHI/J.C. WRIGHT



STATE PLANE COORDINATE: TOTAL DEPTH (FT): 52.20 GROUND ELEVATION (FT): 5338.30 PROJECT NUMBER: WAP LOG OF BORING NUMBER:  
 NORTH: 749121 AREA: SE BUFFER ZONE CASING DIAMETER (IN): 2.00 GEOLOGIST: K.R. MIYOSHI 10194  
 EAST: 2088283 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 07/08/94  
 REMARKS: HOLLOWSTEN AUGER, K.R. MIYOSHI/J.C. WRIGHT



STATE PLANE COORDINATE:  
 NORTH: 76219 AREA: 0-SERIES POINTS  
 EAST: 295691 LOCATION NUMBER: 0  
 REMARKS: HOLLISTER AREA, K.R. MORTIMER, G. HOLLISTER

TOTAL DEPTH (FT): 17.00  
 GROUND ELEVATION (FT): 5623.80  
 CASING DIAMETER (IN): 2.00  
 BOREHOLE DIAMETER (IN): 10.00

PROJECT NUMBER: 1498  
 GEOLOGIST: K.R. MORTIMER  
 DATE DRILLED: 07/12/94

LOG OF BOREHOLE NUMBER:

10294

DEPTH (FT)	PERCENT RECOVERY	RECOVERY INTERVAL	DATUM (FT)	DEPTH (FT)	REL. OR. PRESENT OR OBSERVATION	LITHOLOGY	UNITED STATES CLASSIFICATION OR ROCK TYPE	DESCRIPTION
0.00	100	2.00	5611.5	1.00				NO RECOVERY: 0-2.2'
1.00	100	2.00	5611.5	2.00				No recovery. Surface casing.
2.00	100	2.00	5611.5	3.00				
3.00	100	2.00	5611.5	4.00				
4.00	100	2.00	5611.5	5.00				
5.00	100	2.00	5611.5	6.00				
6.00	100	2.00	5611.5	7.00				
7.00	100	2.00	5611.5	8.00				
8.00	100	2.00	5611.5	9.00				
9.00	100	2.00	5611.5	10.00				
10.00	100	2.00	5611.5	11.00				
11.00	100	2.00	5611.5	12.00				
12.00	100	2.00	5611.5	13.00				
13.00	100	2.00	5611.5	14.00				
14.00	100	2.00	5611.5	15.00				
15.00	100	2.00	5611.5	16.00				
16.00	100	2.00	5611.5	17.00				

NO RECOVERY: 0-2.2'  
 No recovery. Surface casing.

2.2-3.7'  
 Sandy clay with trace silt. Mod. yellow brown (10R 5/4).  
 Sand: f.g., poorly graded angular to sub-round abundant frosted quartz, some clear quartz, and trace feldspar stained quartz, feldspar and mica. Mod. plasticity, argillaceous cement with calcareous (HCl) effervescence and f. clots and streaks, no apparent bedding compact. Abundant organic matter, moist. Gravel: 0%, sand: 31%, silt: 3%, clay: 65%.

3.7-6.4'  
 Clayey sand with trace silt. Mod. yellow orange (10R 6/4).  
 Sand: c.g. to f.g., org. f.g., poorly graded sub-angular to round abundant frosted quartz, some clear and feldspar stained quartz with trace feldspar and mica. No bedding, loose sand and trace clayey clumps, trace calcareous (HCl) effervescence weakly, moist. Gravel: 0%, sand: 77%, silt: 4%, clay: 28%.

6.4-7'  
 Clayey sand with some silt. Mod. yellow brown (10R 5/4).  
 Sand: s.g. to f.g., org. f.g., poorly graded sub-angular to round abundant frosted quartz, some clear and feldspar stained quartz, trace feldspar, mica and feldspar. No bedding, loose sand with some clay clumps. Trace argillaceous cement. Moist. Gravel: 0%, sand: 63%, silt: 9%, clay: 28%.

7-14.4'  
 Clayey sand with trace silt. Mod. yellow brown (10R 5/4).  
 Sand: s.g. to f.g., org. f.g., poorly graded sub-angular to round abundant frosted quartz, some clear and feldspar stained quartz, trace feldspar and mica. No bedding, loose sand with some clay clumps and trace gravel (to 1 inch). Moist. Gravel: 0%, sand: 94%, silt: 1%, clay: 5%.

No recovery (12.0-13.9').

10294

Total Depth Drilled: 17.00	Total Depth Casing: 17.00
Bottom of Filter Pack: 14.60	

STATE PLANE COORDINATE: TOTAL DEPTH (FT): 10.70  
 NORTH: 74497 AREA: SE BEYER ZONE  
 EAST: 293664 LOCATION NUMBER: 0  
 REMARKS: HELDOSTER ABER, K.R. MONTGOMERY, 6. HELDOSTER

GROUND ELEVATION (FT): 550.30  
 CASING DIAMETER (IN): 2.00  
 BOSSHOLE DIAMETER (IN): 6.00

PROJECT NUMBER: WPP  
 GEOLOGIST: K.R. MONTGOMERY  
 DATE DRILLED: 08/09/94

LOG OF BOREHOLE NUMBER:

10394

CHEMICAL SAMPLE DEPTH  
 GRADATIONAL SAMPLE DEPTH  
 SAMPLE NUMBER

SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/ INTERVAL	DATUM (FT) DEPTH (FT)	WELL OR PIEDMONT CONSTRUCTION	LITHOLOGY	UNITED STATES CLASSIFICATION OR SOIL TYPE	DESCRIPTION
		0.00 (2.9)	0				NO RECOVERY: 0-2.4' No recovery.
		1.60 (2.3)	1				6A: 2.4-6.7' finely sand with trace silt and clay. Mod. yellow brown (10R 5/4). Gravel: to 2 1/2 inches, avg. 7/8 inch, round quartz-feldspar metamorphic, granite, amphibolite. Sand: f.g. to c.g. avg. 1/8, well graded, angular to sub-angular, abundant frosted and feldt stained quartz, trace clear and milky quartz, w/ics, quartz-feldspar metamorphics, granite, schist. No apparent bedding, loose, unconsolidated material, trace calcareous coatings at 6.0-6.7'. Dry. Gravel: 57%, sand: 38%, silt: 3%, clay: 2%.
		2.00 (2.0)	2				6B: 6.7-8' Gravel-sand-clay mix with trace silt. Mod. yellow brown (10R 5/4). Gravel: to 2 3/4 inch, avg. 7/8 inch, round quartz-feldspar metamorphics, granite, amphibolite, quartzite. Sand: f.g. to n.g., avg. 1/8, well graded, angular to sub-angular, abundant frosted and feldt stained quartz, trace granite, w/ics, clear quartz, quartz-feldspar metamorphics. No bedding, generally loose material with local trace clayey layers with argillaceous cement. Dry. Gravel: 62%, sand: 27%, silt: 2%, clay: 12%.
		2.00 (2.0)	3				6C: 8.0-10.1' Top of bedrock. Clovestone with some sand and trace silt. Gray orange (10R 6/4). Sand: v.f.g. to n.g., avg. v.f.g., well sorted, angular to sub-round, abundant frosted quartz, trace clear and feldt stained quartz, w/ics, quartz-feldspar metamorphics. Slightly porous, argillaceous and trace calcareous cement (MC) effervesces and J. Slightly friable, mottled, no apparent bedding, earthy feldt streaks, trace carbonaceous inclusions, calcareous increases at 9.7 ft. downward. Moist. Gravel: 18%, sand: 7%, silt: 3%, clay: 90%.

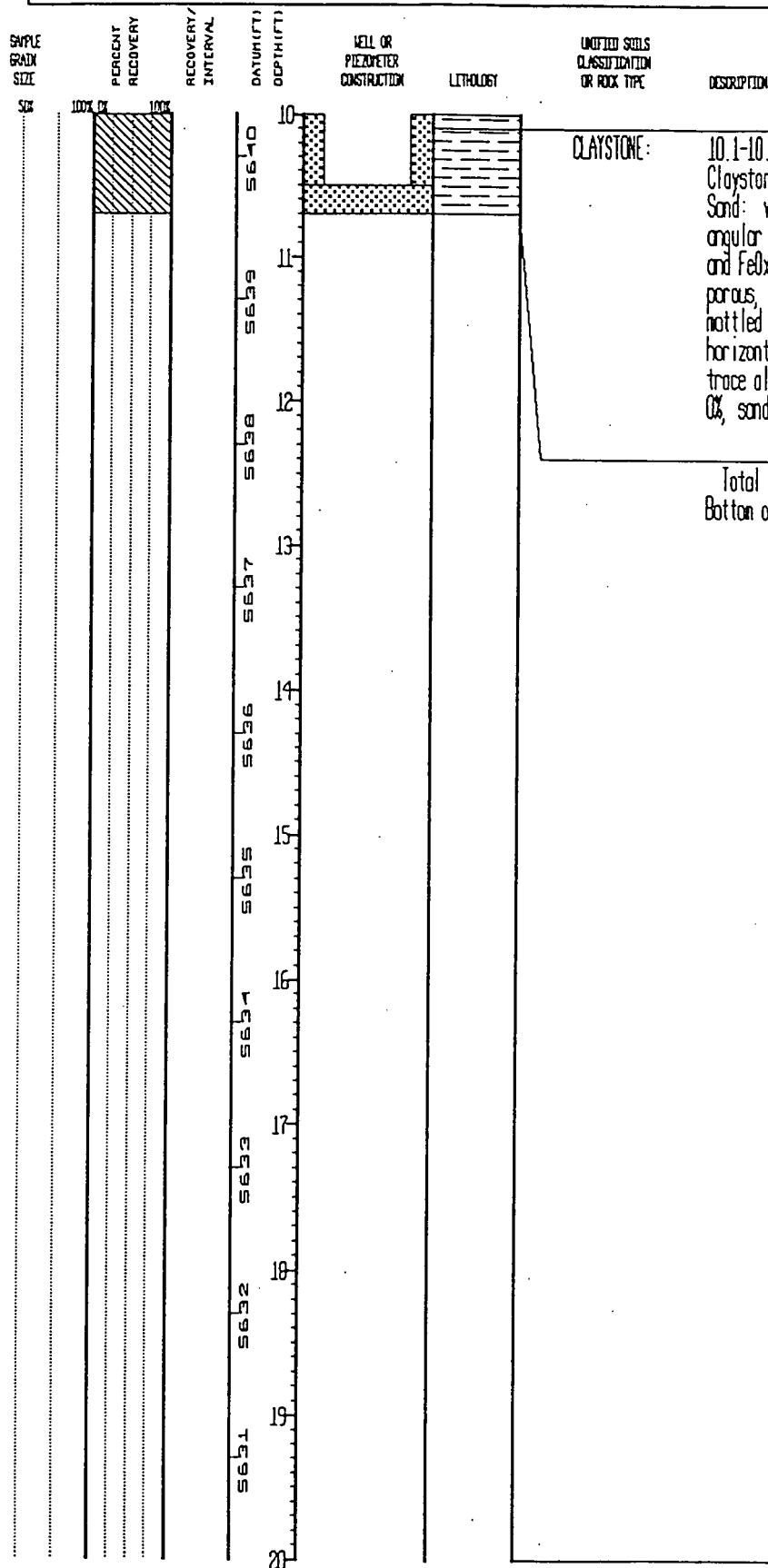
STATE PLANE COORDINATE: TOTAL DEPTH (FT): 10.70  
NORTH: 744947 AREA: SE BUFFER ZONE  
EAST: 2093664 LOCATOR NUMBER: 0  
REMARKS: HOLLOWSTEN AUGER, K.R. MOTOSHI/A.G. WILCINSKI

GROUND ELEVATION (FT): 5650.30  
CASING DIAMETER (IN): 2.00  
BOREHOLE DIAMETER (IN): 6.00

PROJECT NUMBER: WAPP  
GEOLOGIST: K.R. MOTOSHI  
DATE DRILLED: 08/04/94

LOG OF BORING NUMBER:

10394



Total Depth Drilled: 10.70  
Bottom of Filter Pack: 8.20

Total Depth Casing: 10.50



STATE PLANE COORDINATE: TOTAL DEPTH (FT): 10.40 GROUND ELEVATION (FT): 5759.60 PROJECT NUMBER: WAPP LOG OF BORING NUMBER: 10494  
 NORTH: 753888 AREA: NE BUFFER ZONE CASING DIAMETER (IN): GEOLOGIST: K.R. MIYOSHI  
 EAST: 2088536 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 06/13/94  
 REMARKS: HOLLOWSTEM AUGER, K.R. MIYOSHI/A.G. KILCINSKI NOTE: WELL WAS ABANDONED 6/14/94 DUE TO SURFACE PVD FAILURE AND WAS REPLACED BY WELL 12094.

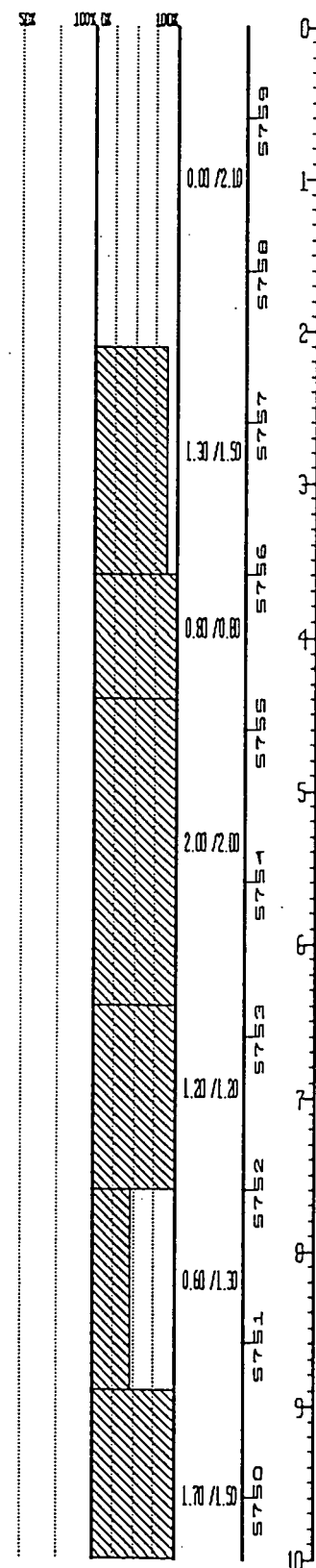
CHEMICAL SAMPLE DEPTH  
 GRADATIONAL SAMPLE DEPTH  
 SAMPLE NUMBER

WELL OR  
 PNEUMETER  
 CONSTRUCTION

LITHOLOGY

UNITED STATES  
 CLASSIFICATION  
 OR ROCK TYPE

DESCRIPTION



NO RECOVERY:	0-2.1'	Surface casing, no recovery.
SH:	2.1-3.3'	Gravelly sand with some clay and trace silt. Mod. yellow brown (10YR 5/2). Gravel: to 2 1/2 inches, avg. 1/2 inch, well graded, sub-round, quartz-feldspar-metamorphics and trace schist and quartzite. Sand: f.g. to c.g., avg. n.g., well graded, sub-angular to sub-round. Abundant frosted quartz, some clear and Fe <sup>2+</sup> stained quartz, trace milky quartz, Fe <sup>2+</sup> and quartz-feldspar-metamorphics. No apparent bedding, dry. Gravel: 35%, sand: 58%, silt: <1%, clay: 2%.
SH:	3.3-6.2'	Sandy gravel with trace clay and silt. Mod. yellow brown (10YR 5/2). Gravel: to 2 3/4 inches, avg. 1 inch, well graded, sub-angular to sub-round, abundant quartz-feldspar-metamorphics, trace quartzite, schist. Sand: f.g. to c.g., avg. c.g., well graded, angular to sub-round, abundant frosted quartz, some Fe <sup>2+</sup> stained quartz, quartz-feldspar-metamorphics, granite and schist, trace Fe <sup>2+</sup> . No apparent bedding. Moist. Gravel: 60%, sand: 34%, silt: 1%, clay: 5%. No recovery (3.3-3.6').
SC:	6.2-7.4'	Clayey sand with some gravel and trace silt. Mod. yellow brown (10YR 5/2). Gravel: to 1 1/4 inch, avg. 1/2 inch, well graded, angular to sub-round, abundant quartz-feldspar-metamorphics, some amphibolite, schist, granite and quartzite. Sand: f.g. to c.g., avg. f.g., well graded, angular to sub-round, abundant frosted quartz, some quartz-feldspar-metamorphics, granite, schist and quartzite, trace Fe <sup>2+</sup> stained quartz and clear quartz. No apparent bedding, possibly fining upwards. Moist. Gravel: 23%, sand: 49%, silt: 1%, clay: 27%.
CLAYSTONE:	7.4-10.4'	Top of Bedrock. Claystone with trace silt and sand. Mod. yellow brown (10YR 5/2). Sand: f.g., very well sorted, sub-angular to sub-round, abundant frosted quartz, trace clear and Fe <sup>2+</sup> stained quartz with Fe <sup>2+</sup> and mica. Nonporous, argillaceous cement, nonfriable, no apparent bedding. Very compact, moist. Gravel: 0%, sand: 2%, silt: 4%, clay: 94%. No recovery (8.2-8.9').

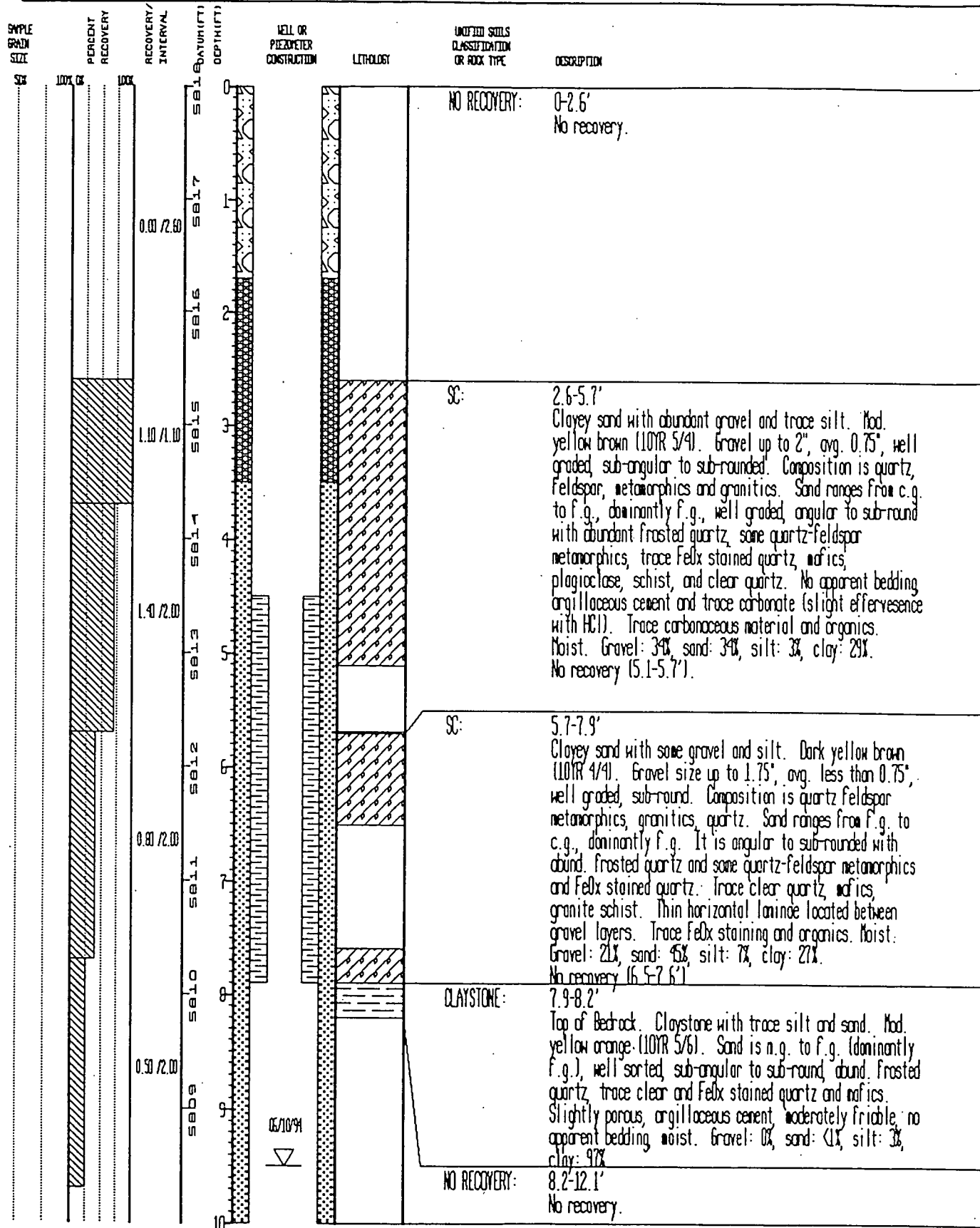
STATE PLANE COORDINATE: TOTAL DEPTH (FT): 10.40 GROUND ELEVATION (FT): 5759.60 PROJECT NUMBER: WAPP LOG OF BORING NUMBER: 10494  
 NORTH: 753888 AREA: NE BUFFER ZONE CASING DIAMETER (IN): GEOLGIST: K.R. MITOSHI  
 EAST: 2088536 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 06/13/94  
 REMARKS: HOLLOWSTEM AUGER, K.R. MITOSHI/A.G. WILCINSKI NOTE: WELL WAS ABANDONED 6/14/94 DUE TO SURFACE PNO FAILURE AND WAS REPLACED BY WELL 12094.

CHEMICAL SAMPLE DEPTH  
 GRAVIMETRIC SAMPLE DEPTH  
 SAMPLE NUMBER  
 SAMPLE GRAIN SIZE  
 PERCENT RECOVERY  
 RECOVERY INTERVAL  
 DATUM (FT)  
 DEPTH (FT)  
 WELL OR PIEZOMETER CONSTRUCTION  
 LITHOLOGY  
 UNOBTAINED SOILS CLASSIFICATION OR ROCK TYPE  
 DESCRIPTION

Total Depth Drilled: 10.40

10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
5749  
5748  
5747  
5746  
5745  
5744  
5743  
5742  
5741  
5740

STATE PLANE COORDINATE: TOTAL DEPTH (FT): 12.10 GROUND ELEVATION (FT): 588.00 PROJECT NUMBER: WRP LOG OF BORING NUMBER: 10594  
 NORTH: 752124 AREA: A SERIES POND CASING DIAMETER (IN): 2.00 GEOLOGIST: J. WRIGHT  
 EAST: 2086746 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 06/10/94  
 REMARKS: BOREHOLE DRILLED TO 12.1 FT. THEN BACKFILLED TO 10.45 FT. "SMUTTER SEAL" SURFACE COMPLETION.



CREATION: UNTILL DEPTH  
 GRADATIONAL SAMPLE DEPTH  
 SAMPLE NUMBER

0.00 / 1.10

0.00 / 1.10

0.00 / 2.20

06/10/94

STATE PLANE COORDINATE: NORTH: 752124 EAST: 2086746 TOTAL DEPTH (FT): 12.10 AREA: A SERIES POWDS LOCATOR NUMBER: 0 GROUND ELEVATION (FT): 5818.00 CASING DIAMETER (IN): 2.00 BOREHOLE DIAMETER (IN): 6.00 PROJECT NUMBER: WAP GEOLOGIST: J. WRIGHT DATE DRILLED: 06/10/94 LOG OF BORING NUMBER: 10594

REMARKS: BOREHOLE DRILLED TO 12.1 FT. THEN BACKFILLED TO 10.45 FT. "SANITARY SEAL" SURFACE COMPLETION.

DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
10.00				
11.00				
12.00				
13.00				
14.00				
15.00				
16.00				
17.00				
18.00				
19.00				
20.00				

Total Depth Drilled: 12.10  
Bottom of Filter Pack: 10.50  
Total Depth Casing: 10.50

STATE PLANE COORDINATE:  
 NORTH: 73359  
 EAST: 208957  
 REMARKS: HOLLOW SIGN AREA, KERRY MOTORS/LEFT ROUGH

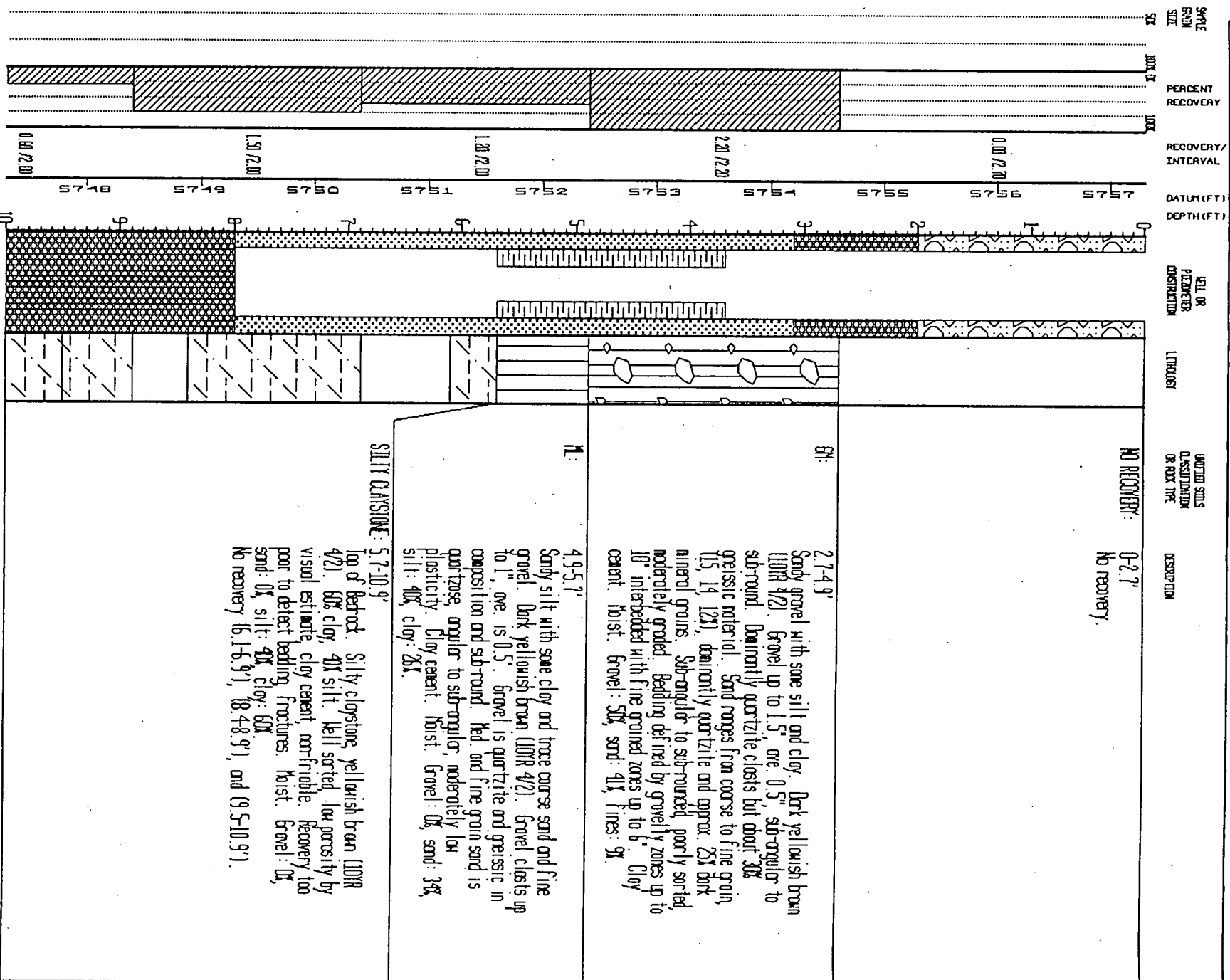
TOTAL DEPTH (FT): 10.90  
 AREA: BUTTER ZONE  
 LOCATION NUMBER: 0

GROUND ELEVATION (FT): 557.30  
 CRUSH DIAMETER (IN): 2.00  
 ROCKS: DIAMETER (IN): 6.50

PROJECT NUMBER: WPP  
 GEOLGIST: KERRY MOTORS  
 DATE DRILLED: 06/15/94

LOG OF BOREHOLE NUMBER:

10694



STATE PLANE COORDINATE: TOTAL DEPTH (FT): 10.90 GROUND ELEVATION (FT): 5757.30 PROJECT NUMBER: WRP LOG OF BORING NUMBER: 10694  
 NORTH: 752659 AREA: BUFFER ZONE CASING DIAMETER (IN): 2.00 GEOLOGIST: KERRY KATOSHI  
 EAST: 2088757 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.50 DATE DRILLED: 06/16/94  
 REMARKS: HOLLOW STEM AUGER, KERRY KATOSHI/JEFF WRIGHT

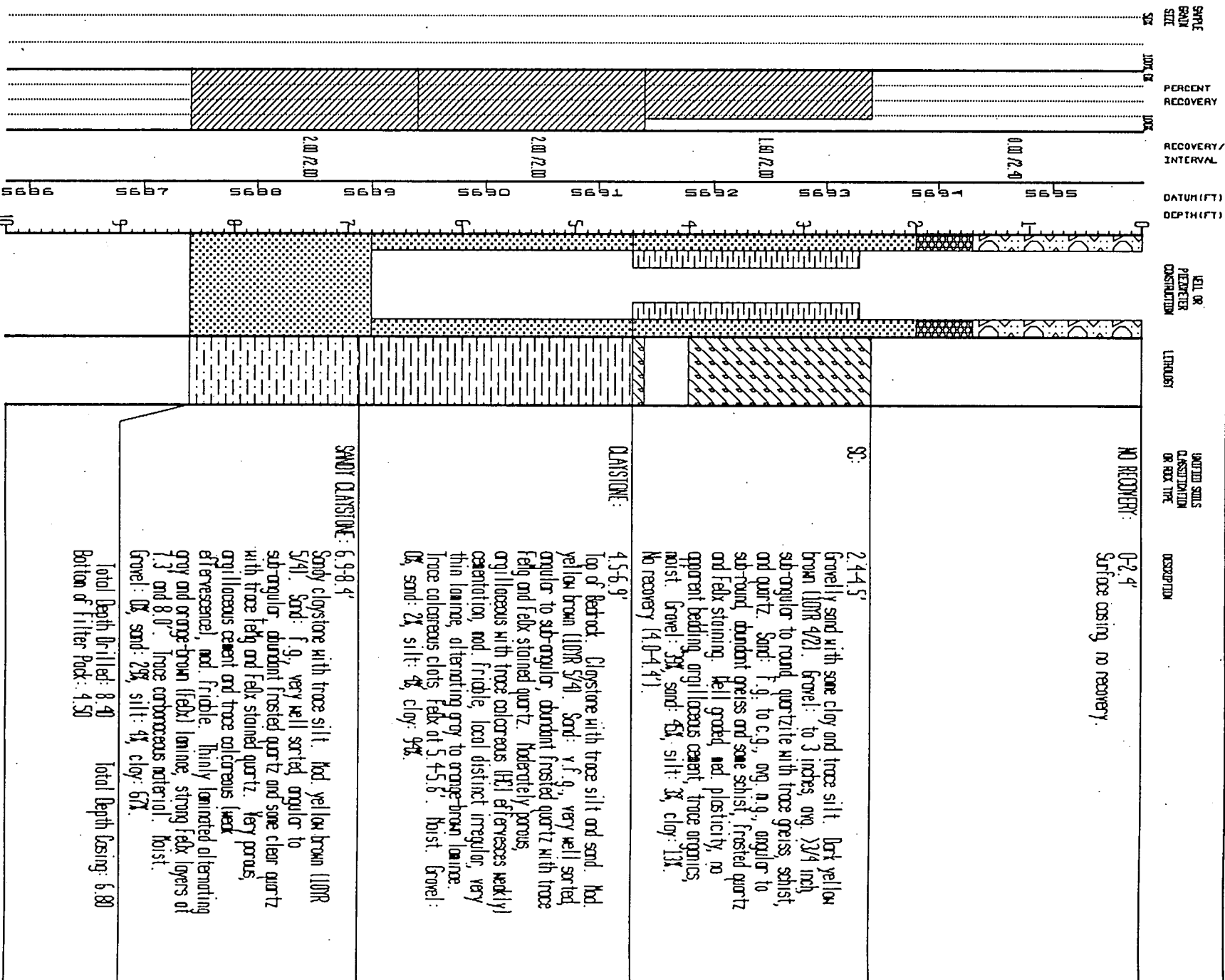
DEPTH (FT) SAMPLE GRAIN SIZE PERCENT RECOVERY RECOVERY INTERVAL DATE (FT) DEPTH (FT) WELL OR PIEZOMETER CONSTRUCTION LITHOLOGY UNSATURATED SOILS CLASSIFICATION OR ROCK TYPE DESCRIPTION

Total Depth Drilled: 10.90  
 Bottom of Filter Pack: 8.00  
 Total Depth Casing: 8.00

10 5747  
 11 5746  
 12 5745  
 13 5744  
 14 5743  
 15 5742  
 16 5741  
 17 5740  
 18 5739  
 19 5738  
 20

STATE PLANE COORDINATE: TOTAL DEPTH (FT): 8.40 GROUND ELEVATION (FT): 565.80 PROJECT NUMBER: WAP LOG OF DRILLING NUMBER:  
 NORTH: 75305 AREA: E. WALNUT CREEK CASD6 DIAMETER (IN): 2.00 GEOLGIST: K.R. MORSHELI  
 EST: 200659 LOCATION NUMBER: 0 BOREHOLE DIAMETER (IN): 6.50 DATE DRILLED: 06/27/94  
 REMARKS: HOLLOWSTAIR ABER, K.R. MORSHELI, 6. HOLLOWSTAIR WATER TOWER, NEW LEI, WILL BEEN SIGNIFICANT DEVELOPMENT

10794



STATE PLANE COORDINATE:

NORTH: 753948

EAST: 2092348

REMARKS: HOLLOWSTEN AUGER, K.R. MIYOSHI/A.G. WILCINSKI

TOTAL DEPTH (FT): 10.20

AREA: EAST WALNUT CREEK

LOCATOR NUMBER: 0

GROUND ELEVATION (FT): 5666.70

CASING DIAMETER (IN): 2.00

BOREHOLE DIAMETER (IN): 6.00

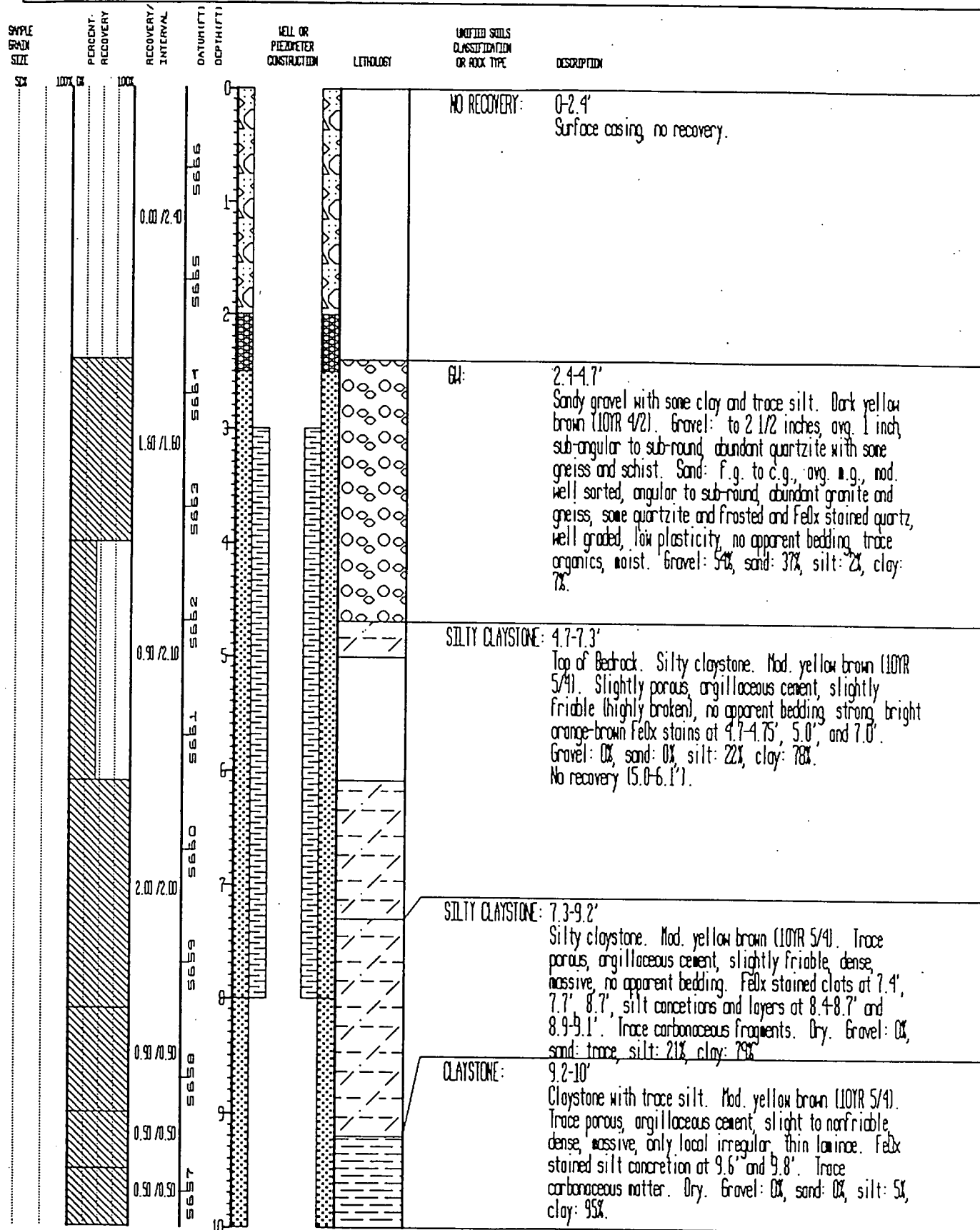
PROJECT NUMBER: WAPP

GEOLOGIST: K.R. MIYOSHI

DATE DRILLED: 07/15/94

LOG OF BORING NUMBER:

10894



DEVIATION, TURN, TOTAL DEPTH

GRADATIONAL SAMPLE DEPTH

SAMPLE NUMBER

BATHYMETRIC

BATHYMETRIC



STATE PLANE COORDINATE: TOTAL DEPTH (FT): 10.20  
 NORTH: 753948 AREA: EAST WALNUT CREEK  
 EAST: 2092348 LOCATOR NUMBER: 0  
 REMARKS: HOLLOWSTEM AUGER, K.R. MIYOSHI/A.G. WILCINSKI

GROUND ELEVATION (FT): 5666.70  
 CASING DIAMETER (IN): 2.00  
 BOREHOLE DIAMETER (IN): 6.00

PROJECT NUMBER: WRP  
 GEOLOGIST: K.R. MIYOSHI  
 DATE DRILLED: 07/15/94

LOG OF BOREHOLE NUMBER:

10894

CREATED: SAMPLE DEPTH  
 GRADATIONAL SAMPLE DEPTH  
 SAMPLE NUMBER

SAMPLE GRAIN SIZE PERCENT RECOVERY RECOVERY INTERVAL DATUM (FT) DEPTH (FT) WELL OR PIECEWISE CONSTRUCTION LITHOLOGY UNIFIED SOILS CLASSIFICATION OR ROCK TYPE DESCRIPTION

Total Depth Drilled: 10.20  
 Bottom of Filter Pack: 8.00

Total Depth Casing: 10.20

10 5666 5665 5654 5653 5652 5651 5650 5649 5648 5647 20

STATE PLANE COORDINATE: TOTAL DEPTH (FT): 19.70  
NORTH: 747431 AREA: SOUTH BUFFER ZONE  
EAST: 2083256 LOCATOR NUMBER: 0  
REMARKS: HOLLOW STEM AUGER, JEFF WRIGHT/JEFF WRIGHT

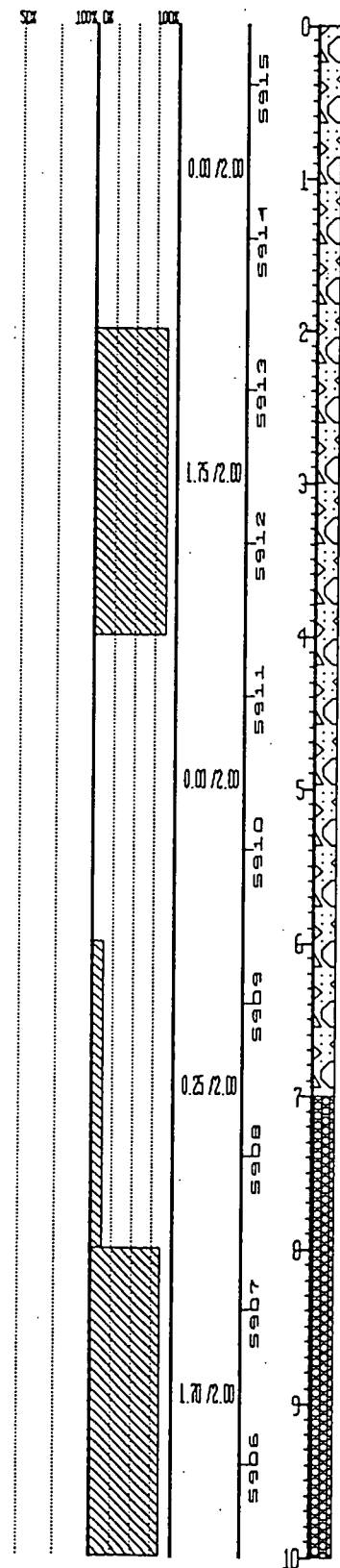
GROUND ELEVATION (FT): 5915.40  
CASING DIAMETER (IN): 2.00  
BOREHOLE DIAMETER (IN): 6.50

PROJECT NUMBER: WAPP  
GEOLOGIST: J.C. WRIGHT  
DATE DRILLED: 05/19/94

LOG OF BORING NUMBER:

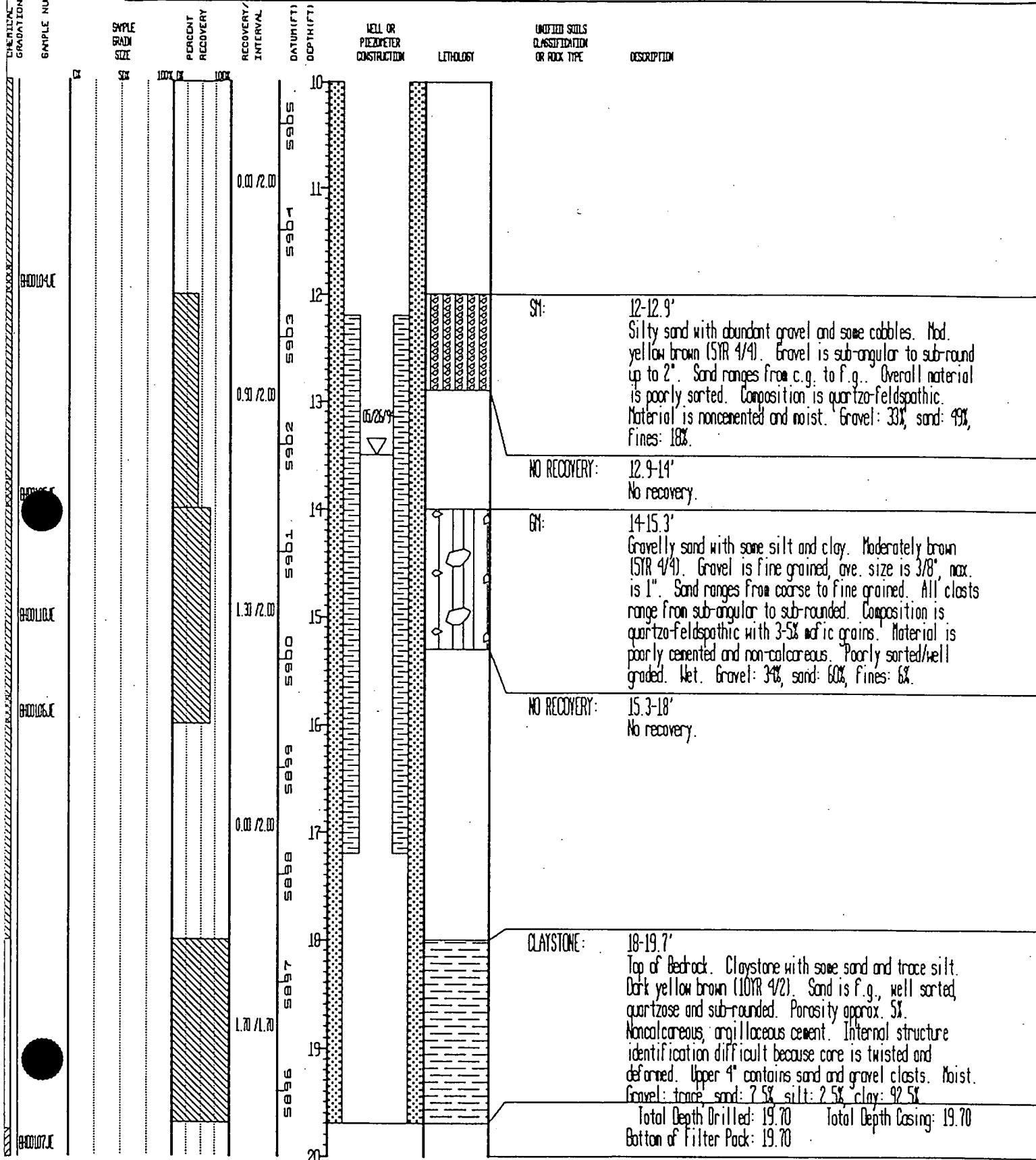
10994

USE FOR: TYPICAL DEPTH  
GRADATIONAL SAMPLE DEPTH  
SAMPLE NUMBER  
SAMPLE GRAIN SIZE  
PERCENT RECOVERY  
RECOVERY INTERVAL  
DATE (FT)  
DEPTH (FT)  
WELL OR PIEZOMETER CONSTRUCTION  
LITHOLOGY  
UNIFIED SOILS CLASSIFICATION OR ROCK TYPE  
DESCRIPTION

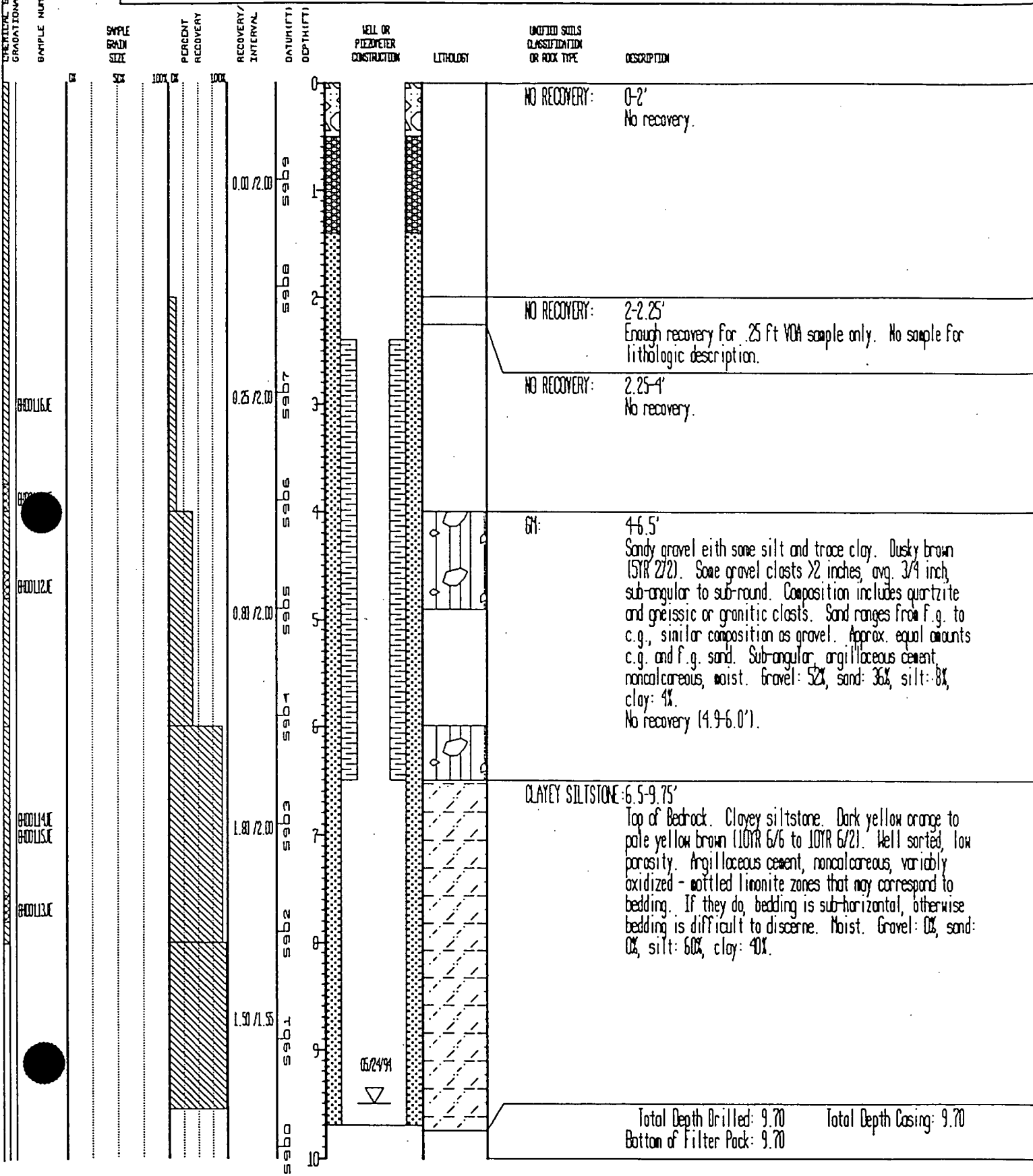


NO RECOVERY:	0-2'	No recovery.
ML:	2-3'	Clayey silt with trace fine grained sand and trace fine gravel. Dusky yellow brown (10YR 2/2). Sand is fine grained, sub-angular quartzose. Max gravel size is approx. 0.4 in., sub-angular, quartzo-feldspathic. Poorly graded. Fines are moderately plastic and clay cemented. Common plant roots. Moist. Gravel: 0%, sand: 5%, silt: 59.5%, clay: 40%.
SM:	3-3.75'	Silty sand with some clay. Light brown (5YR 5/6). Sand is f.g., poorly graded, sub-angular mostly quartzose with some feldspar. Common caliche, probably CaCO <sub>3</sub> and clay cement. Hard and well cemented. Moist. Gravel: 0%, sand: 57%, silt: 34%, clay: 8%.
NO RECOVERY:	3.75-6'	No recovery.
ML:	6-6.25'	Clayey silt with abundant sand. Moderate yellow brown (10YR 5/4). Sand is f.g., sub-angular to sub-round, quartzose. Poorly graded with abundant CaCO <sub>3</sub> . Probably carbonate-clay cement. Moderately plastic with common caliche. Moist. Gravel: 0%, sand: 26%, silt: 44%, clay: 30%.
NO RECOVERY:	6.25-8'	No recovery.
CL:	8-9.7'	Sandy clay with some silt and some gravel. Moderate yellow brown (10YR 5/4). Sand is f.g., sub-angular to sub-round, quartzose with some nodules. Poorly graded, moderately well cemented with clay, noncalcareous. Moist. Gravel: 0%, sand: 48%, silt: 8%, clay: 44%.
NO RECOVERY:	9.7-12'	No recovery.

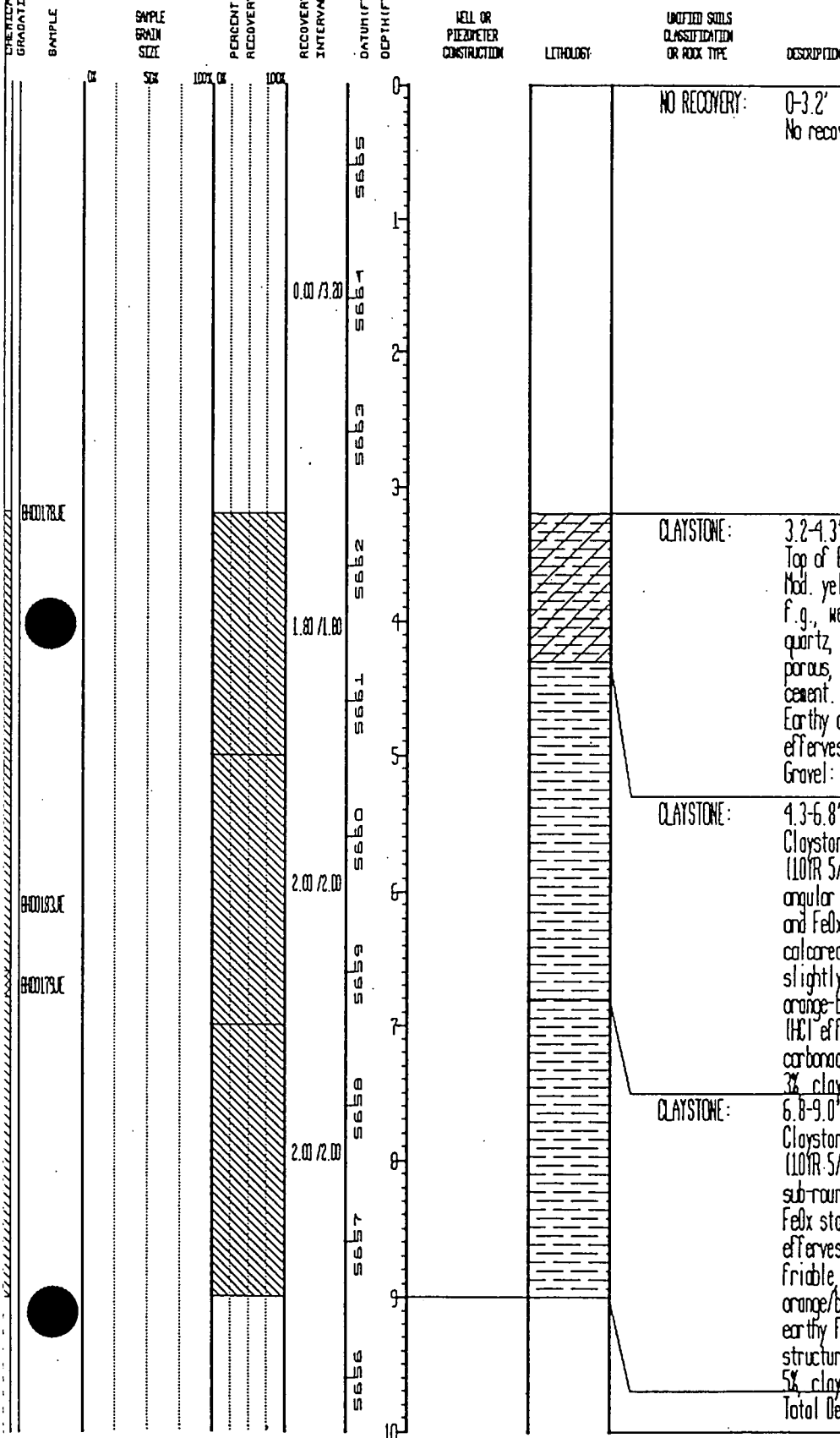
STATE PLANE COORDINATE: TOTAL DEPTH (FT): 19.70 GROUND ELEVATION (FT): 5915.40 PROJECT NUMBER: WAPP LOG OF BORING NUMBER: 10994  
 NORTH: 747431 AREA: SOUTH BUFFER ZONE CASING DIAMETER (IN): 2.00 GEOLOGIST: J.C. WRIGHT  
 EAST: 2083266 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.50 DATE DRILLED: 05/19/94  
 REMARKS: HOLLOW STEM AUGER, JEFF WRIGHT/JEFF WRIGHT



STATE PLANE COORDINATE: TOTAL DEPTH (FT): 9.70 GROUND ELEVATION (FT): 5509.90 PROJECT NUMBER: WAPP LOG OF BORING NUMBER: 11094  
 NORTH: 747259 AREA: SOUTH BUFFER ZONE CASING DIAMETER (IN): 2.00 GEOLOGIST: J.C. WRIGHT  
 EAST: 2082327 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 10.00 DATE DRILLED: 05/20/94  
 REMARKS: HOLLOWSTEN AUGER, J.C. WRIGHT/J.C. WRIGHT NOTE: DUE TO PROXIMITY OF TOP OF SCREEN TO GROUND SURFACE, NO GROUT SEAL WAS USED.



STATE PLANE COORDINATE: TOTAL DEPTH (FT): 9.00 GROUND ELEVATION (FT): 5665.60 PROJECT NUMBER: WHP LOG OF BORING NUMBER: 11194  
 NORTH: 743082 AREA: 0-SERIES POND CASING DIAMETER (IN): GEOLGIST: K.R. MIYOSHI  
 EAST: 2091944 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 07/20/94  
 REMARKS: HOLLISTON AUGER, K.R. MIYOSHI/A.G. WILCINSKI NOTE: 11194 ABANDONED 7/21/94 AND REPLACED WITH 10094.



LOG OF BORING NUMBER:

11294

DATE DROLLED: 07/12/54

11294

SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/ INTERVAL	DATUM(FT)	DEPTH(FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
0-5'	100%	0.00 / 5.00	6171	6170			SM:	Gravelly sand with trace silt and clay. Moderately yellow brown (10YR 5/4). Gravel: avg. <3/4 inch, sub-round, quartz-feldspar-metamorphic, quartzite, schists. Sand: f.g. to c.g., avg. c.g., angular to sub-round, quartz-feldspar-metamorphic, quartzite, granite, gneiss, and schist. No apparent bedding, unconsolidated, organic debris, dry. Jar sample.
		0.00 / 14.60	6162	6163			NO RECOVERY:	5-14.6 No recovery. Alluvium.

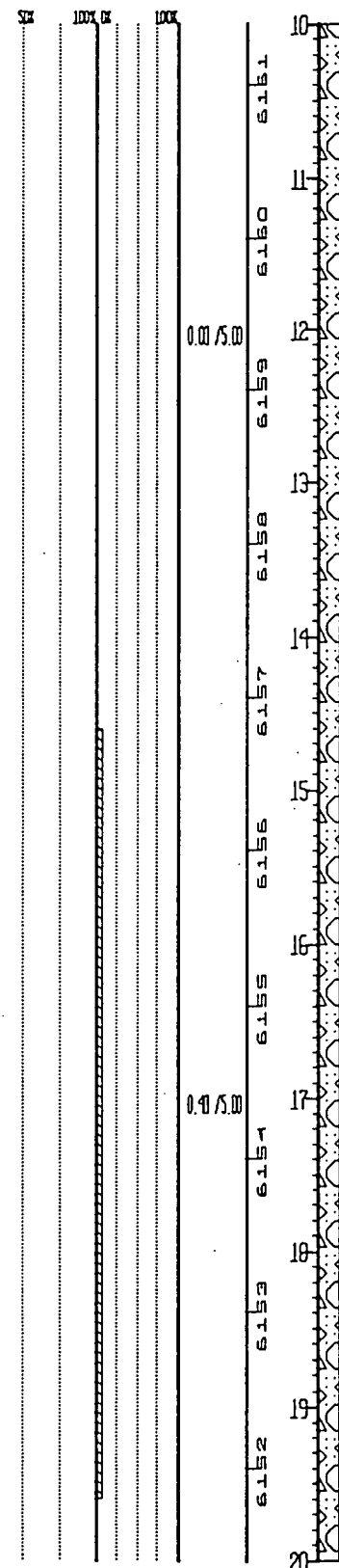
STATE PLANE COORDINATE: TOTAL DEPTH (FT): 78.50 GROUND ELEVATION (FT): 6171.40 PROJECT NUMBER: WAPP LOG OF BORING NUMBER: 11294  
 NORTH: 749405 AREA: WEST BUFFER ZONE CASING DIAMETER (IN): 2.00 GEOLOGIST: J.C. WRIGHT  
 EAST: 2074305 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 07/13/94  
 REMARKS: ODEX, J.C. WRIGHT/A.G. WILCINSKI. NOTE: ANALYSIS ON JAR SAMPLES IS NOT REPRESENTATIVE OF MATERIAL DRILLED, SAMPLE TYPE, GRADE, SORTING, OR ANGULARITY. DATA IS SKEDD HEAVILY. COMPOSITION IS VALID.

WELL OR  
PIEZOMETER  
CONSTRUCTION

LITHOLOGY

UNITED SOILS  
CLASSIFICATION  
OR ROCK TYPE

DESCRIPTION



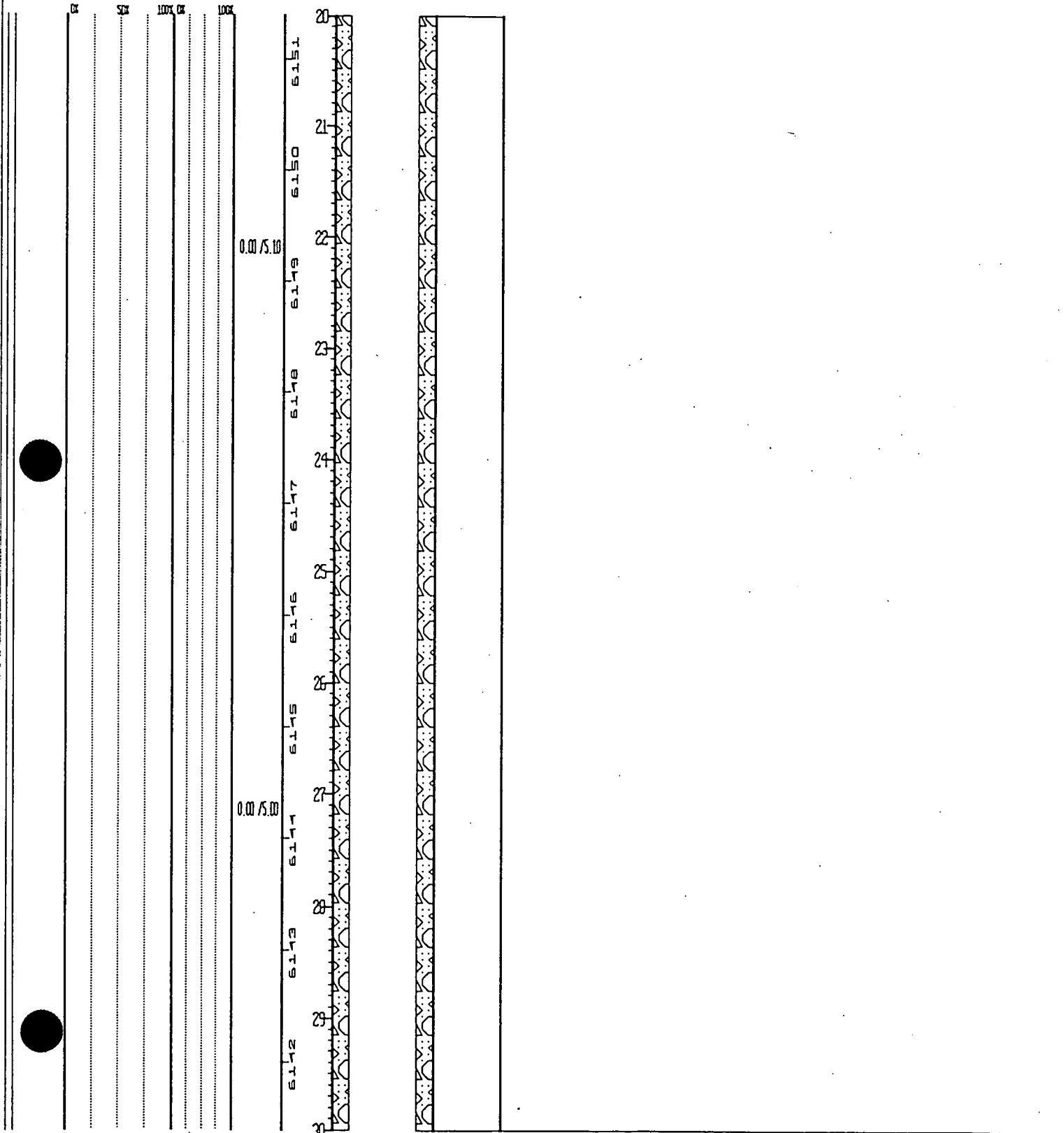
SC: 14.6-15'  
 Clayey sand with abundant gravel and trace silt. Mod. yellow brown (10YR 5/4). Gravel: to 1 1/4 inch, avg. 1/2 inch, sub-round, poorly graded, granite, gneiss and quartzite. Sand: f.g. to c.g., avg. f.g., well graded, angular to sub-round. Abundant frosted quartz, some Fe-stained quartz, trace clear and milky quartz, mafics and mica. No apparent bedding, loose material. Dry. Split spoon sample.

NO RECOVERY: 15-54.7'  
 No recovery. Alluvium.

STATE PLANE COORDINATE: TOTAL DEPTH (FT): 70.50 GROUND ELEVATION (FT): 6171.40 PROJECT NUMBER: WAPP LOG OF BORING NUMBER: 11294  
 NORTH: 749435 AREA: WEST BUFFER ZONE CASING DIAMETER (IN): 2.00 GEOLOGIST: J.C. WRIGHT  
 EAST: 2074305 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 07/13/94  
 REMARKS: CDEI, J.C. WRIGHT/A.G. KILCINSKI. NOTE: ANALYSIS ON JAR SAMPLES IS NOT REPRESENTATIVE OF MATERIAL DRILLED, SAMPLE TYPE, GRADE, SORTING, OR ANGULARITY. DATA IS SKIPPED HEAVILY. COMPOSITION IS VALID.

CHEMICAL SAMPLE DEPTH  
 GRADATIONAL SAMPLE DEPTH  
 SAMPLE NUMBER

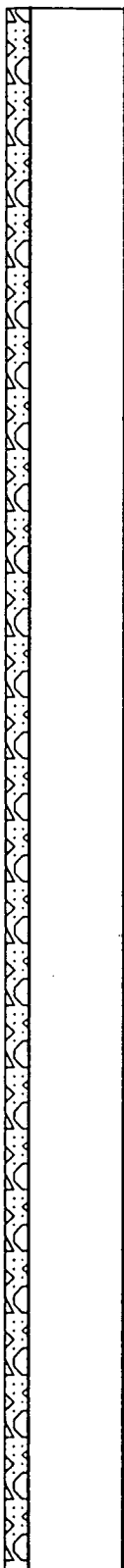
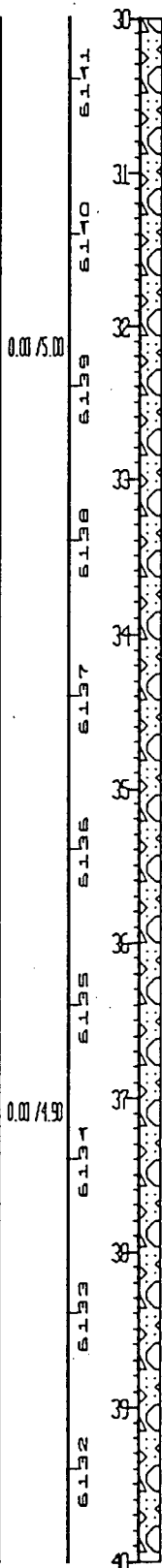
SAMPLE GRAIN SIZE PERCENT RECOVERY RECOVERY INTERVAL DATE (FT) DEPTH (FT) WELL OR PIEZOMETER CONSTRUCTION LITHOLOGY UNIFIED SOILS CLASSIFICATION OR ROCK TYPE DESCRIPTION





STATE PLANE COORDINATE: TOTAL DEPTH (FT): 78.50 GROUND ELEVATION (FT): 6171.40 PROJECT NUMBER: WHP LOG OF BORING NUMBER: 11294  
 NORTH: 74935 AREA: WEST BUFFER ZONE CASING DIAMETER (IN): 2.00 GEOLOGIST: J.C. WRIGHT  
 EAST: 207405 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 07/13/94  
 REMARKS: COCK, J.C. WRIGHT/A.G. KILCORSKI. NOTE: ANALYSIS ON JAR SAMPLES IS NOT REPRESENTATIVE OF MATERIAL DRILLED, SAMPLE TYPE, GRADE, SORTING, OR ANGULARITY. DATA IS SKIPPED HEAVILY. COMPOSITION IS VALID.

CHEMICAL SAMPLE DEPTH  
 GRADATIONAL SAMPLE DEPTH  
 SAMPLE NUMBER  
 SAMPLE GRAIN SIZE  
 PERCENT RECOVERY  
 RECOVERY/INTERVAL  
 DATUM (FT)  
 DEPTH (FT)  
 WELL OR PIEZOMETER CONSTRUCTION  
 LITHOLOGY  
 UNIFIED SOILS CLASSIFICATION OR ROCK TYPE  
 DESCRIPTION



STATE PLANE COORDINATE:

TOTAL DEPTH (FT): 79.50

GROUND ELEVATION (FT): 6171.40

PROJECT NUMBER: WAPP

LOG OF BORING NUMBER:

NORTH: 749435

AREA: WEST BUFFER ZONE

CASING DIAMETER (IN): 2.00

GEOLOGIST: J.C. WRIGHT

EAST: 2074305

LOCATOR NUMBER: 0

BOREHOLE DIAMETER (IN): 6.00

DATE DRILLED: 07/13/94

REMARKS: COCK, J.C. WRIGHT/A.G. KILCOINSE. NOTE: ANALYSIS ON JAR SAMPLES IS NOT REPRESENTATIVE OF MATERIAL DRILLED, SAMPLE TYPE, GRADE, SORTING, OR ANGULARITY. DATA IS SKEWED HEAVILY. COMPOSITION IS VALID.

11294

SAMPLE  
GRAIN  
SIZEPERCENT  
RECOVERYRECOVERY/  
INTERVALDATE (FT)  
DEPTH (FT)WELL OR  
PIEZOMETER  
CONSTRUCTION

LITHOLOGY

UNIFIED SOILS  
CLASSIFICATION  
OR ROCK TYPE

DESCRIPTION

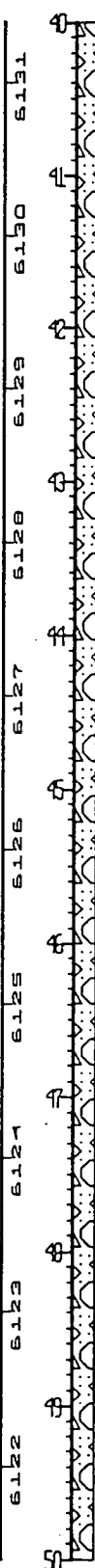
50

100% CR

100%

0.00 / 5.10

0.00 / 5.00



07/13/94



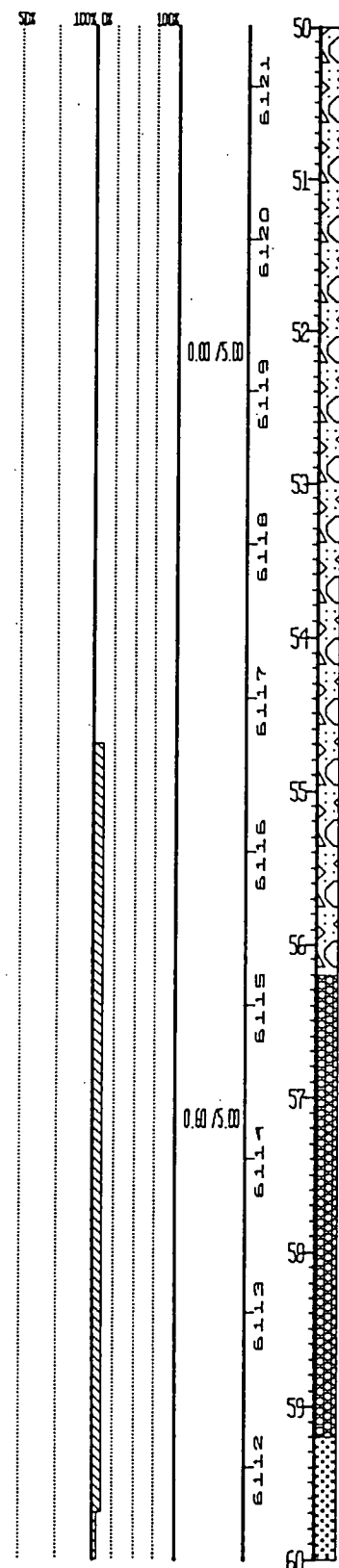
STATE PLANE COORDINATE: TOTAL DEPTH (FT): 79.50 GROUND ELEVATION (FT): 6171.40 PROJECT NUMBER: WAPP LOG OF BORING NUMBER: 11294  
 NORTH: 74935 AREA: WEST BUFFER ZONE CASING DIAMETER (IN): 2.00 GEOLOGIST: J.C. WRIGHT  
 EAST: 2074305 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 07/13/94  
 REMARKS: COCK, J.C. WRIGHT/A.G. WILCZSKI. NOTE: ANALYSIS ON JAR SAMPLES IS NOT REPRESENTATIVE OF MATERIAL DRILLED, SAMPLE TYPE, GRADE, SORTING, OR ANGULARITY. DATA IS SKEWED HEAVILY. COMPOSITION IS VALID.

WELL OR  
PIEZOMETER  
CONSTRUCTION

LITHOLOGY

UNIFIED SOILS  
CLASSIFICATION  
OR ROCK TYPE

DESCRIPTION



SC: 54.7-55.3'  
 Clayey sand with abundant gravel and trace silt. Mod. yellow orange (10YR 5/6). Gravel: to 1 1/2 inches, avg. 5/8 inch. Sub-round, quartz-feldspar-metamorphic, granite, gneiss. Sand: f.g. to c.g., avg. n.g., well graded, angular to sub-angular, abundant frosted quartz and FeOx stained quartz, some clear quartz, trace milky quartz, mafics, and mica. No apparent bedding, loose, unconsolidated, moist. Note: clayey at 54.7 to 58.0 feet. Split spoon sample.

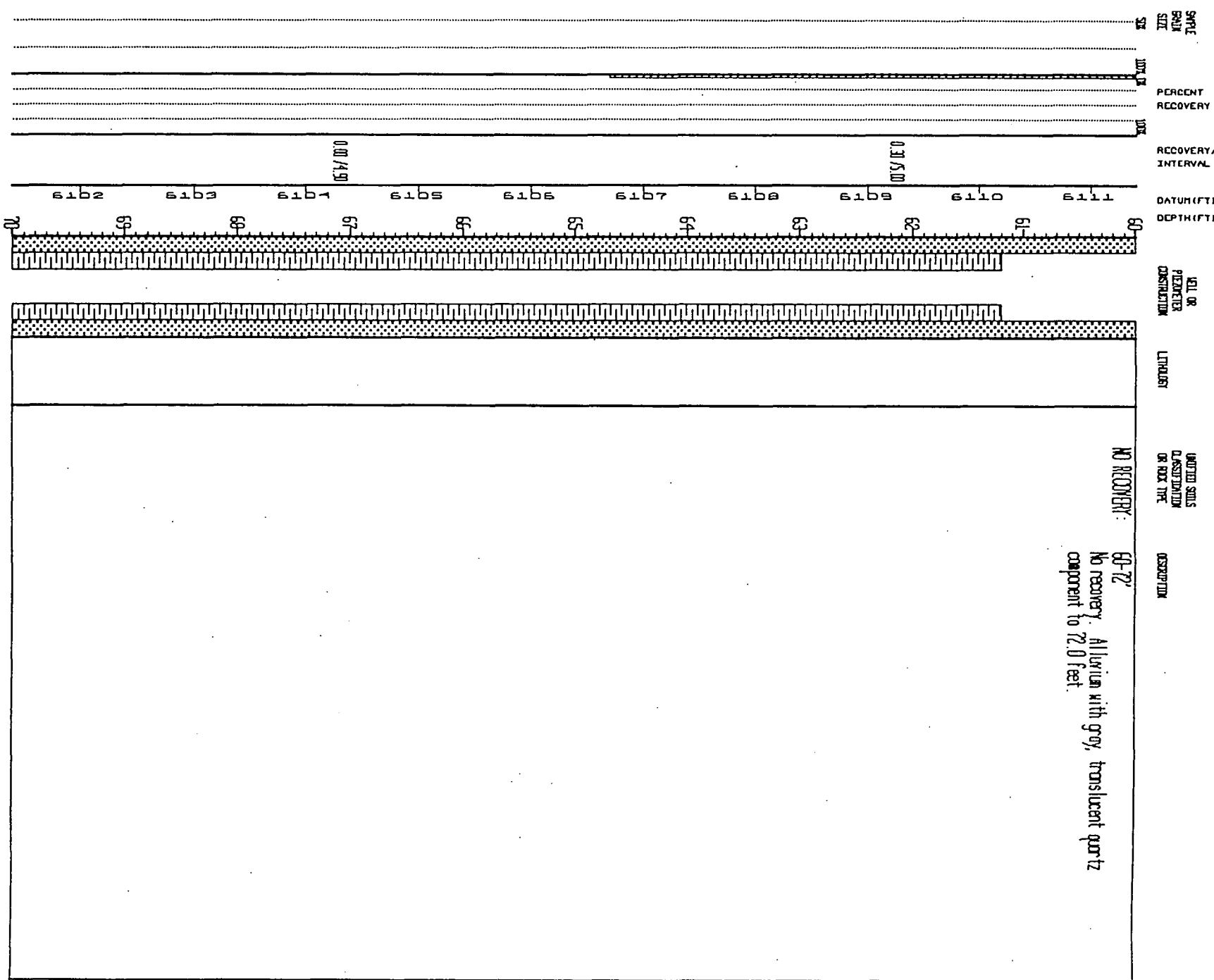
NO RECOVERY: 55.3-59.7'  
 No recovery.

SC: 59.7-60'  
 Clayey sand with some gravel and trace silt. Mod. yellow orange (10YR 5/6). Gravel: to 3/4 inches, avg. 1/2 inch. Sub-round, granitic, gneissic, quartz-feldspar-metamorphic, quartz. Sand: f.g. to c.g., avg. n.g., well graded, angular to sub-round, abundant frosted and FeOx stained quartz. Trace milky and clear quartz, mafic and micas. No apparent bedding, loose, unconsolidated, moist.

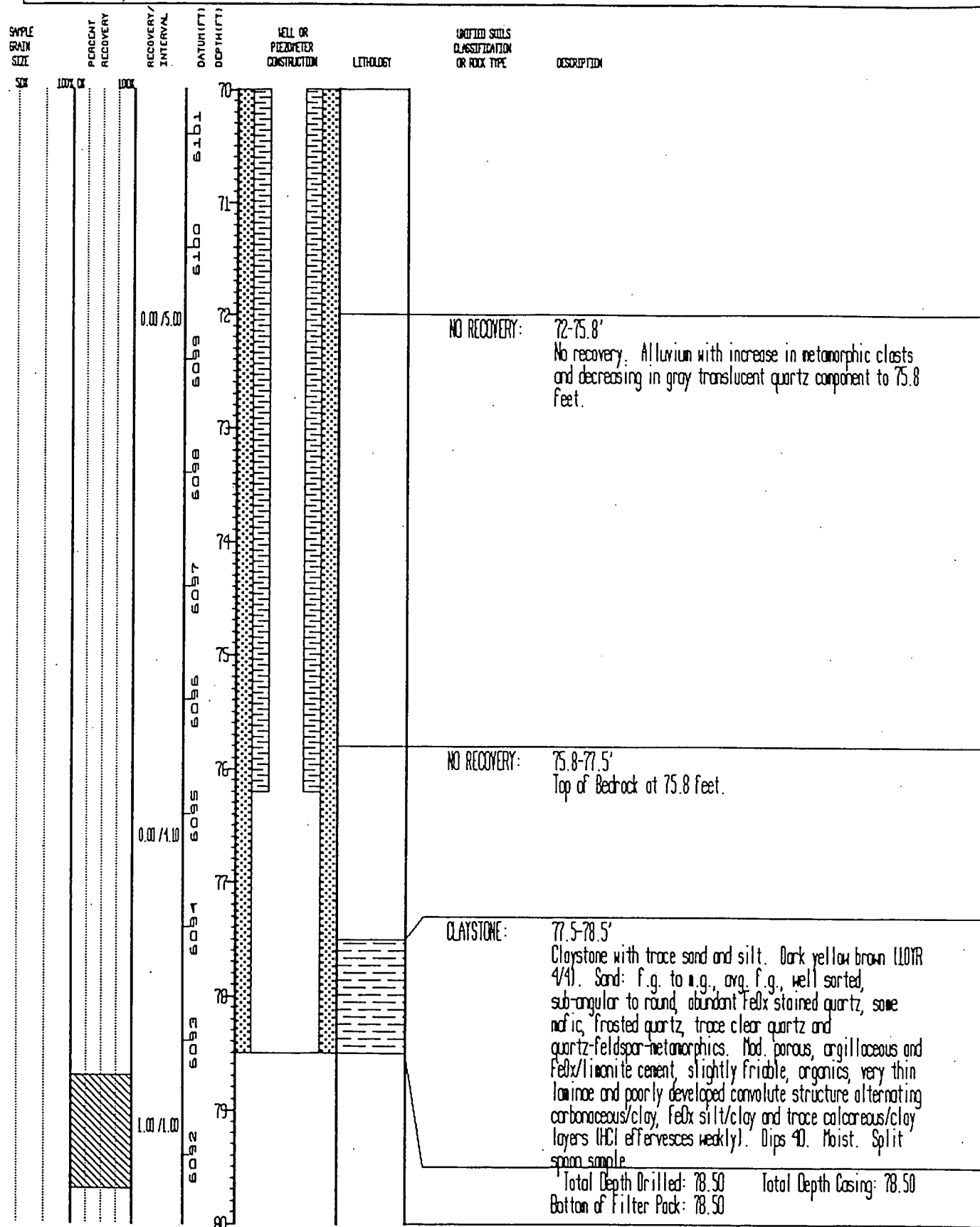
STATE & LOC. COORDINATE: TOTAL DEPTH (FT): 78.50 GROUND ELEVATION (FT): 6171.40 PROJECT NUMBER: W89 LOG OF BORING NUMBER:  
 NORTH: 79935 AREA: WEST BAYVIEW TOWNE CASINO QUARTER (DN): 2.00 GEOLGIST: J.C. WRIGHT  
 EAST: 2074305 LOCATION NUMBER: 0 BORING QUARTER (DN): 6.00 DATE BORING: 07/12/94  
 REMARKS: COX, J.C. INTERV. & G. WILSON & G. WILSON. NOTE: ANALYSIS ON JAR SAMPLES IS NOT REPRESENTATIVE OF MATERIAL BORING, SAMPLE TYPE, GRADE, STRONG, OR WEAKNESS. DATA IS SOLED HEAVILY. DEPOSITION IS VALID.

11294

CHEMICAL SAMPLE DEPTH  
 GRADATIONAL SAMPLE DEPTH  
 SAMPLE NUMBER

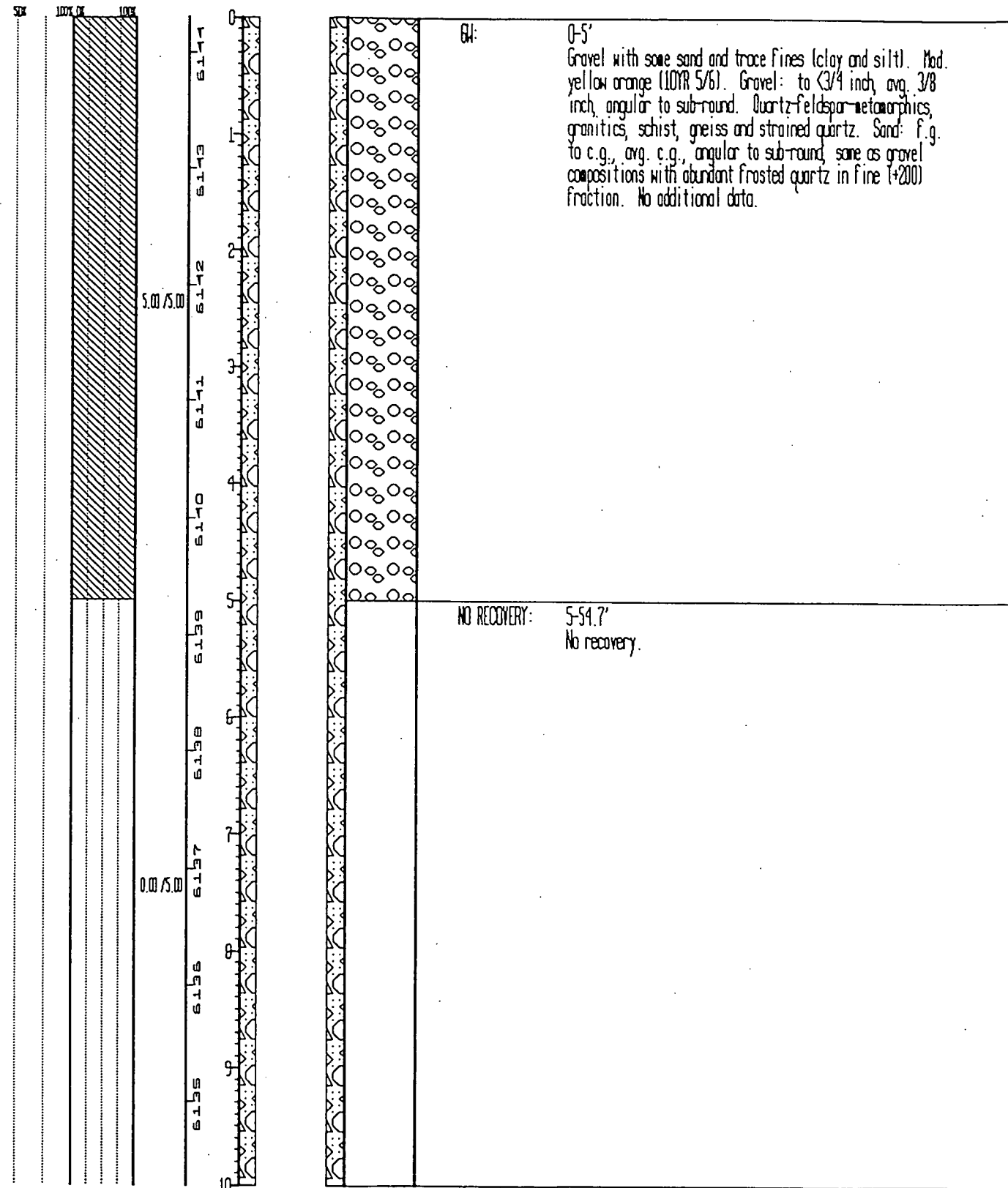


11294



STATE PLANE COORDINATE: TOTAL DEPTH (FT): 75.30 GROUND ELEVATION (FT): 6141.30 PROJECT NUMBER: WAPP LOG OF BORING NUMBER:  
 NORTH: 747847 AREA: WEST SPRAY FIELD CASING DIAMETER (IN): 2.00 GEOLOGIST: K.R. MITOSHI 11394  
 EAST: 2076297 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.50 DATE DRILLED: 06/20/94  
 REMARKS: CODEX, K.R. MITOSHI/A.G. KUCZAKSKI. NOTE: DRILLED BY PERCUSSION HAMMER METHOD. DATA SKEWED HEAVILY TOWARD COARSE FRACTIONS. ALL FRACTIONS BROKEN BY HAMMER. GRADING, SORTING, SIZING, AND GEOLOGIC DATA OBTAINED MAY BE MISLEADING.

SAMPLE GRAIN SIZE PERCENT RECOVERY RECOVERY INTERVAL DATUM (FT) DEPTH (FT) WELL OR PIEZOMETER CONSTRUCTION LITHOLOGY UNIFIED SOILS CLASSIFICATION OR ROCK TYPE DESCRIPTION



LOG OF BOARDING NUMBER:

K.R. MOTUSHI

DATE ORDERED: 06/20/74

11394

### DESCRIPTION

Station	Distance	Station	Distance
1001	0.00	1010	6131
1002	0.00	1011	6132
1003	0.00	1012	6133
1004	0.00	1013	6134
1005	0.00	1014	6135
1006	0.00	1015	6136
1007	0.00	1016	6137
1008	0.00	1017	6138
1009	0.00	1018	6139
1010	0.00	1019	6140
1011	0.00	1020	6141
1012	0.00	1021	6142
1013	0.00	1022	6143
1014	0.00	1023	6144
1015	0.00	1024	6145
1016	0.00	1025	6146
1017	0.00	1026	6147
1018	0.00	1027	6148
1019	0.00	1028	6149
1020	0.00	1029	6150
1021	0.00	1030	6151
1022	0.00	1031	6152
1023	0.00	1032	6153
1024	0.00	1033	6154
1025	0.00	1034	6155
1026	0.00	1035	6156
1027	0.00	1036	6157
1028	0.00	1037	6158
1029	0.00	1038	6159
1030	0.00	1039	6160
1031	0.00	1040	6161
1032	0.00	1041	6162
1033	0.00	1042	6163
1034	0.00	1043	6164
1035	0.00	1044	6165
1036	0.00	1045	6166
1037	0.00	1046	6167
1038	0.00	1047	6168
1039	0.00	1048	6169
1040	0.00	1049	6170
1041	0.00	1050	6171
1042	0.00	1051	6172
1043	0.00	1052	6173
1044	0.00	1053	6174
1045	0.00	1054	6175
1046	0.00	1055	6176
1047	0.00	1056	6177
1048	0.00	1057	6178
1049	0.00	1058	6179
1050	0.00	1059	6180
1051	0.00	1060	6181
1052	0.00	1061	6182
1053	0.00	1062	6183
1054	0.00	1063	6184
1055	0.00	1064	6185
1056	0.00	1065	6186
1057	0.00	1066	6187
1058	0.00	1067	6188
1059	0.00	1068	6189
1060	0.00	1069	6190
1061	0.00	1070	6191
1062	0.00	1071	6192
1063	0.00	1072	6193
1064	0.00	1073	6194
1065	0.00	1074	6195
1066	0.00	1075	6196
1067	0.00	1076	6197
1068	0.00	1077	6198
1069	0.00	1078	6199
1070	0.00	1079	6200
1071	0.00	1080	6201
1072	0.00	1081	6202
1073	0.00	1082	6203
1074	0.00	1083	6204
1075	0.00	1084	6205
1076	0.00	1085	6206
1077	0.00	1086	6207
1078	0.00	1087	6208
1079	0.00	1088	6209
1080	0.00	1089	6210
1081	0.00	1090	6211
1082	0.00	1091	6212
1083	0.00	1092	6213
1084	0.00	1093	6214
1085	0.00	1094	6215
1086	0.00	1095	6216

11394

**SAMPLE NUMBER**

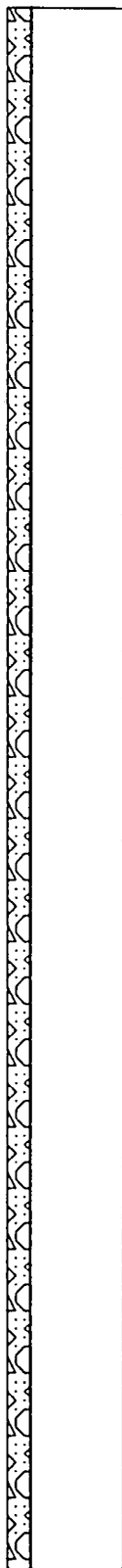
SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/ INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
50X	100X	100X		20				
				21				
				22				
		0.00/5.00	6122	23				
			6121	24				
			6120	25				
			6119	26				
			6118	27				
		0.00/5.00	6117	28				
			6116	29				
			6115	30				



STATE PLANE COORDINATE: TOTAL DEPTH (FT): 75.30 GROUND ELEVATION (FT): 6144.30 PROJECT NUMBER: WARP LOG OF BORING NUMBER: 11394  
 NORTH: 747047 AREA: WEST SPRAY FIELD CASING DIAMETER (IN): 2.00 GEOLOGIST: K.R. MOTOSHI  
 EAST: 2076297 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.50 DATE DRILLED: 06/20/94  
 REMARKS: CODEX, K.R. MOTOSHI/A.G. KLODINSKI. NOTE: DRILLED BY PERCUSSION HAMMER METHOD. DATA SKEWED HEAVILY TOWARD COARSE FRACTIONS. ALL FRACTIONS BROKEN BY HAMMER. GRADING, SORTING, SIZING, AND GEOLOGIC DATA OBTAINED MAY BE MISLEADING.

SAMPLE GRAIN SIZE PERCENT RECOVERY RECOVERY INTERVAL DATE/DEPTH WELL OR PIEZOMETER CONSTRUCTION LITHOLOGY UNIFIED SOILS CLASSIFICATION OR ROCK TYPE DESCRIPTION

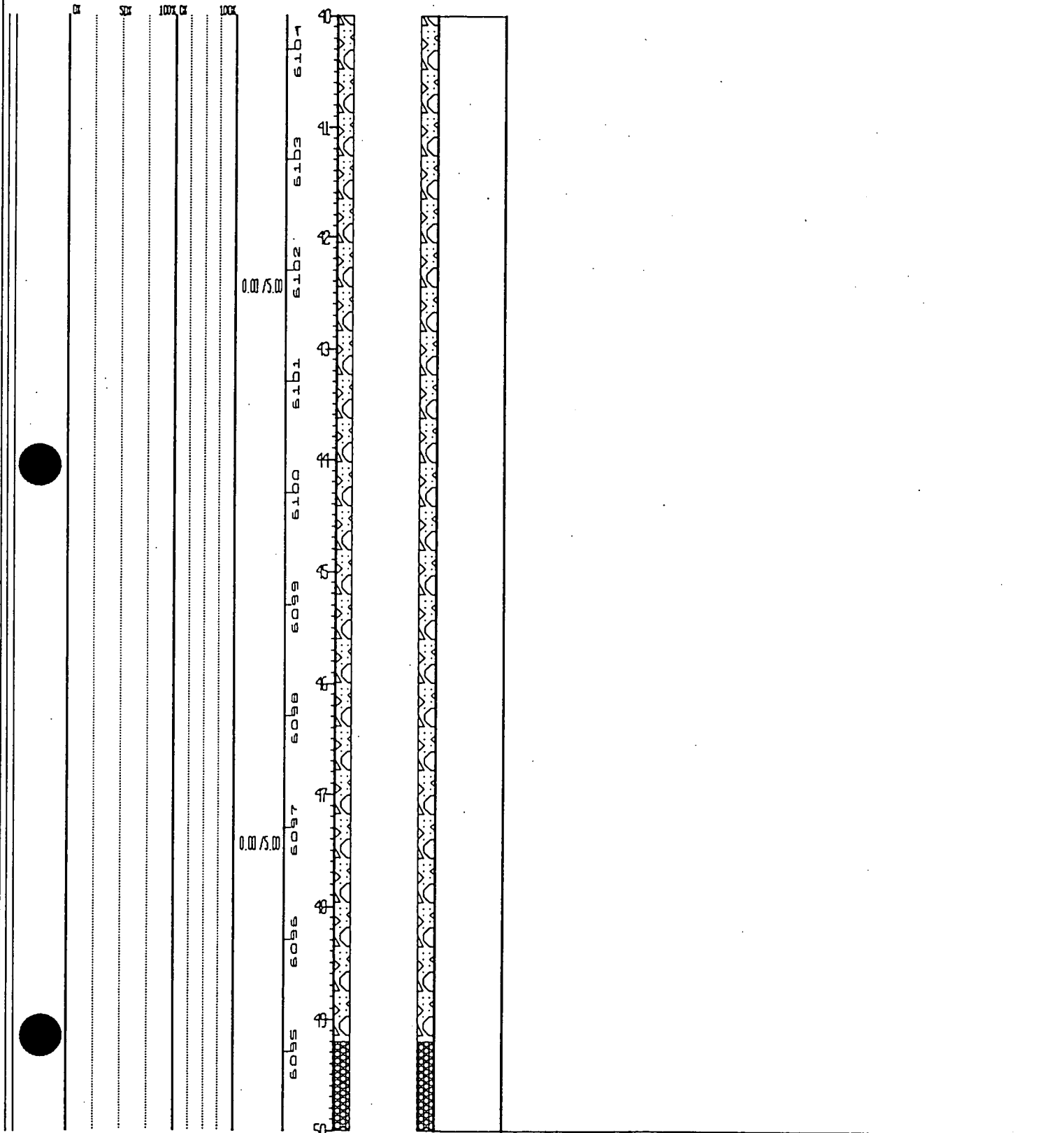
100%	100%	100%	0.00 / 5.00	0.00 / 5.00	6114	30			
					6113	31			
					6112	32			
					6111	33			
					6110	34			
					6109	35			
					6108	36			
					6107	37			
					6106	38			
					6105	39			
					6104	40			



STATE PLANE COORDINATE: TOTAL DEPTH (FT): 75.30 GROUND ELEVATION (FT): 6144.30 PROJECT NUMBER: WRP LOG OF BORING NUMBER: 11394  
 NORTH: 747847 AREA: WEST SPRAY FIELD CASING DIAMETER (IN): 2.00 GEOLOGIST: K.R. KITOSHI  
 EAST: 2776297 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.50 DATE DRILLED: 06/20/94  
 REMARKS: CCEX, K.R. KITOSHI/A.G. KILCINSKI. NOTE: DRILLED BY PERCUSSION HAMMER METHOD. DATA SKEWED HEAVILY TOWARD COARSE FRACTIONS. ALL FRACTIONS BROKEN BY HAMMER. GRADING, SORTING, SIZING, AND GEOLOGIC DATA OBTAINED MAY BE MISLEADING.

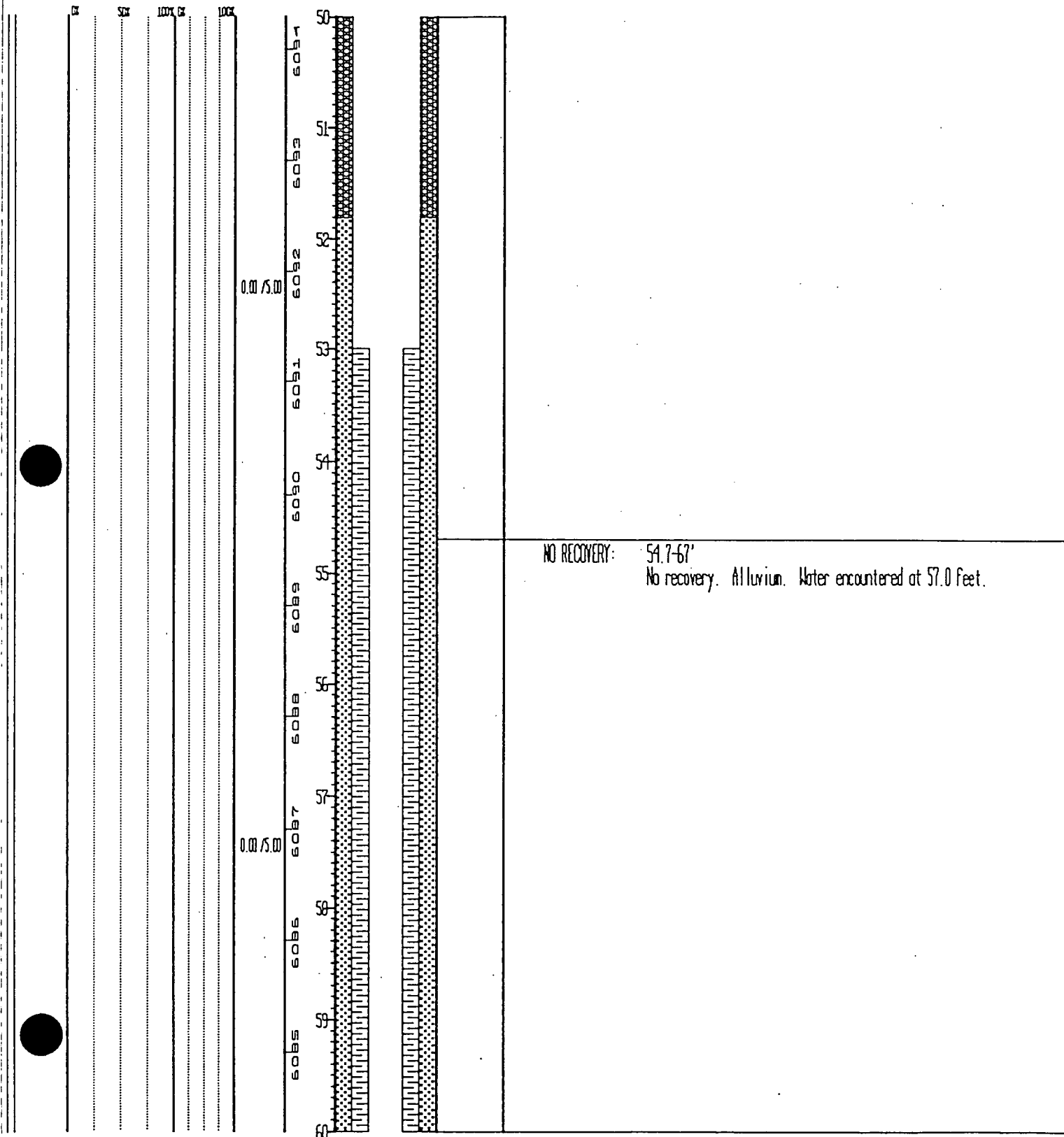
CHEMICAL ANALYSIS DEPTH  
 GRADATIONAL SAMPLE DEPTH  
 SAMPLE NUMBER

SAMPLE GRAIN SIZE  
 PERCENT RECOVERY  
 RECOVERY/INTERVAL  
 DATUM(FT)  
 DEPTH(FT)  
 WELL OR PIEZOMETER CONSTRUCTION  
 LITHOLOGY  
 UNIFIED SOILS CLASSIFICATION OR ROCK TYPE  
 DESCRIPTION



STATE PLANE COORDINATE: TOTAL DEPTH (FT): 75.30 GROUND ELEVATION (FT): 6144.30 PROJECT NUMBER: WHP LOG OF BORING NUMBER: 11394  
 NORTH: 747897 AREA: WEST SPRAY FIELD CASING DIAMETER (IN): 2.00 GEOLOGIST: K.R. MIYOSHI  
 EAST: 2076297 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.50 DATE DRILLED: 06/20/94  
 REMARKS: CDEX, K.R. MIYOSHI/A.G. WILCINSKI. NOTE: DRILLED BY PERCUSSION HAMMER METHOD. DATA SKEWED HEAVILY TOWARD COARSE FRACTIONS. ALL FRACTIONS BROKEN BY HAMMER. GRADING, SORTING, SIZING, AND GEOLOGIC DATA OBTAINED MAY BE MISLEADING.

DATE: 06/20/94  
 BOREHOLE DIAMETER (IN): 6.50  
 CASING DIAMETER (IN): 2.00  
 TOTAL DEPTH (FT): 75.30  
 GROUND ELEVATION (FT): 6144.30  
 PROJECT NUMBER: WHP  
 LOG OF BORING NUMBER: 11394  
 GEOLOGIST: K.R. MIYOSHI  
 DATE DRILLED: 06/20/94  
 REMARKS: CDEX, K.R. MIYOSHI/A.G. WILCINSKI. NOTE: DRILLED BY PERCUSSION HAMMER METHOD. DATA SKEWED HEAVILY TOWARD COARSE FRACTIONS. ALL FRACTIONS BROKEN BY HAMMER. GRADING, SORTING, SIZING, AND GEOLOGIC DATA OBTAINED MAY BE MISLEADING.

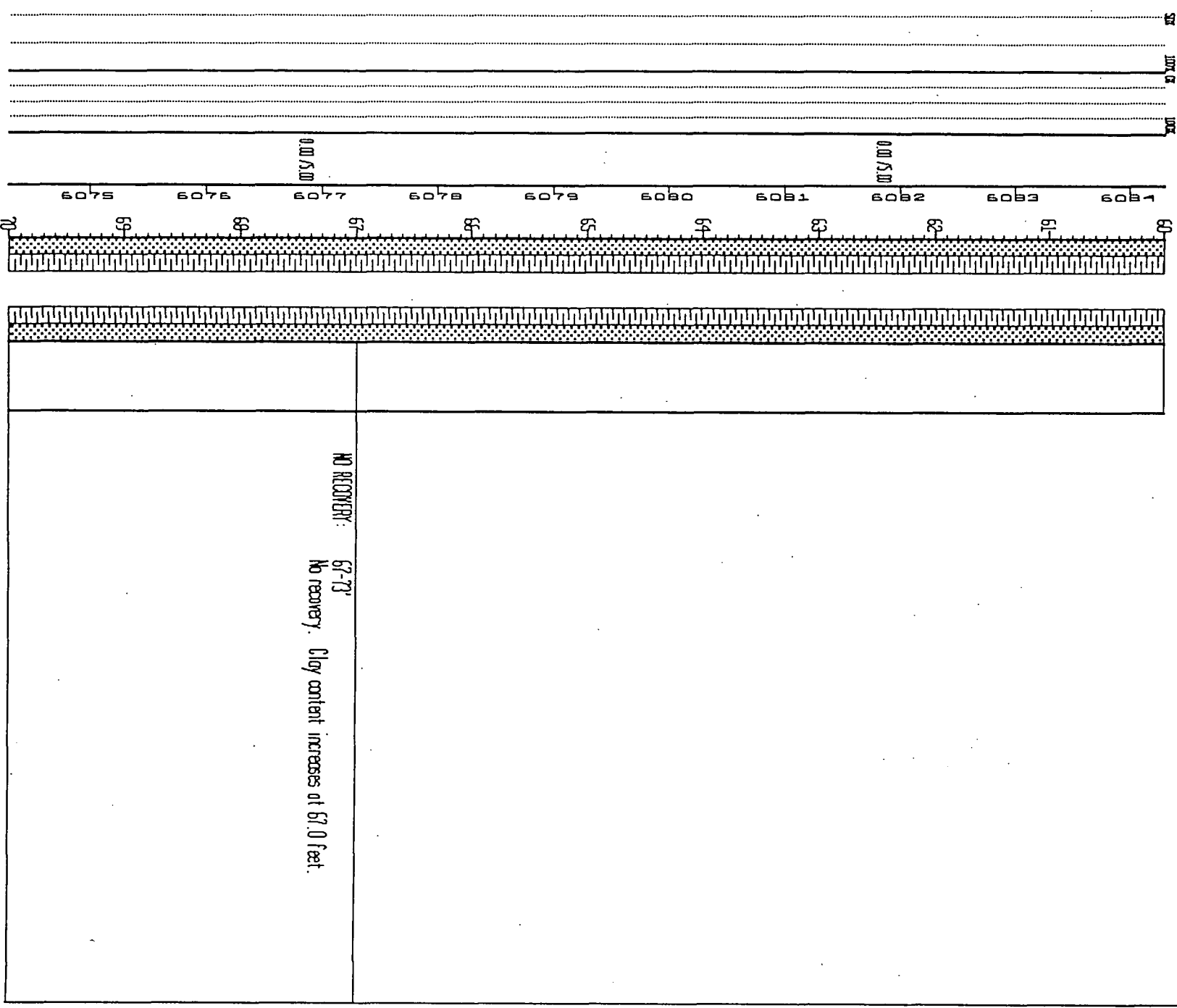


CHEMICAL SAMPLE DEPTH  
GRADATIONAL SAMPLE DEPTH  
SAMPLE NUMBER

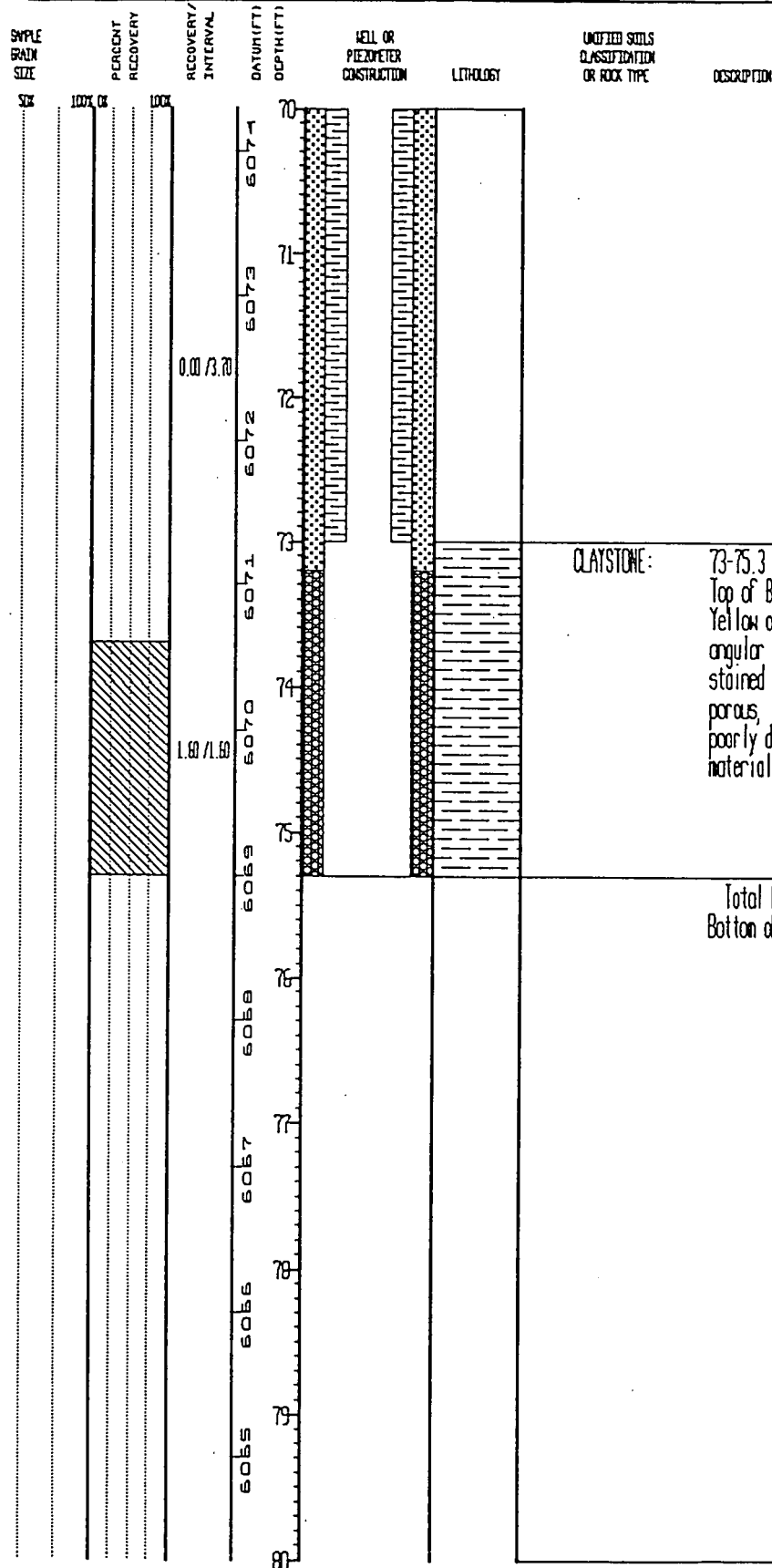
STATE PLANE COORDINATE: TOTAL DEPTH (FT): 75.30 GROUND ELEVATION (FT): 6144.30 PROJECT NUMBER: WRP  
NORTH: 74067 AREA: WEST SPAN FIELD CASING DIAMETER (IN): 2.00 BOLDENIST: K.R. MOTTSHI  
EAST: 2076297 LOCATION NUMBER: 0 BOREHOLE DIAMETER (IN): 6.50 DATE DRILLED: 06/20/94  
REMARKS: COCK K.R. MOTTSHI & S. WILSON. NOTE: DRILLED BY PERCUSSION W/ WATER METHOD. DATA SUGGEST HEAVILY TOWARD COARSE FRACTIONS. ALL FRACTIONS BROKEN BY W/ATER. GRAVITY, SORTING, SIZING, AND GEOLOGIC DATA OBTAINED MAY BE MISLEADING.

11394

SAMPLE  
DEPTH  
FEET  
PERCENT  
RECOVERY  
RECOVERY/  
INTERVAL  
DATE (FT)  
DEPTH (FT)  
SILT OR  
FILLER  
CONCENTRATION  
LITHOLOGY  
LOCATION SOILS  
DESCRIPTION  
OR ROCK TYPE  
DESCRIPTION



STATE PLANE COORDINATE: TOTAL DEPTH (FT): 75.30 GROUND ELEVATION (FT): 6144.30 PROJECT NUMBER: WPP LOG OF BORING NUMBER: 11394  
 NORTH: 747847 AREA: WEST SPRAY FIELD CASING DIAMETER (IN): 2.00 GEOLOGIST: K.R. MIYOSHI  
 EAST: 2076297 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.50 DATE DRILLED: 06/20/94  
 REMARKS: CDEI, K.R. MIYOSHI/A.G. KILCINSKI. NOTE: DRILLED BY PERCUSSION HAMMER METHOD. DATA SKEWED HEAVILY TOWARD COARSE FRACTIONS. ALL FRACTIONS BROKEN BY HAMMER. GRADING, SORTING, SIZING, AND GEOLOGIC DATA OBTAINED MAY BE MISLEADING.



EAST: 2074267

LOCATOR NUMBER: 0

BOREHOLE DIAMETER (IN): 6.00

DATE DTDIED: 06/28/54

LOG OF BORING NUMBER:

11494

REMARKS: COEX, JEFF WRIGHT/JEFF WRIGHT. NOTE: GRAIN SIZE DIST., BEDDING ANGULARITY, CEMENTATION, MOISTURE CONTENT, ETC. COULD NOT BE DETERM.

DUE TO DRILLING METHOD. CUTTINGS OBTAINED AT SURFACE DO NOT REPRESENT ACTUAL ALLUVIAL MATERIAL. DRILLING METHOD AND SAMPLE COLLECTION WERE AT DIRECTION OF ES&S

SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/ INTERVAL	DATUM(FT) DEPTH(FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNSATURATED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
SC	100%	100%					
			6175				0-26' Sandy gravel with some silt and clay. (57% gravel, 34% sand, 9% fines). Moderate yellow brown (10YR 5/4). Max and ave. size of clasts can not be determined because of the use of the precession hammer. Clasts consist of fragments of quartzite, schist, and gneiss. Sand is sub-round to sub-angular and dominantly quartzose. Moderately well graded, dry.
			6176				
			6177				
			6178				
			6179				
			6180				
			6181				
			6182				
			6183				
			6184				

STATE PLANE COORDINATE: TOTAL DEPTH (FT): 69.50 GROUND ELEVATION (FT): 6189.60 PROJECT NUMBER: WAPP LOG OF BORING NUMBER: 11494  
 NORTH: 748147 AREA: WEST BUFFER ZONE CASING DIAMETER (IN): 2.00 GEOLOGIST: J.C. WRIGHT  
 EAST: 2074267 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 06/28/94  
 REMARKS: COCK, JEFF WRIGHT/JEFF WRIGHT. NOTE: GRAIN SIZE TEST, BEDDING, ANGULARITY, CEMENTATION, MOISTURE CONTENT, ETC. COULD NOT BE DETERM.  
 DUE TO DRILLING METHOD. CUTTINGS OBTAINED AT SURFACE DO NOT REPRESENT ACTUAL ALLUVIAL MATERIAL. DRILLING METHOD AND SAMPLE COLLECTION WERE AT DIRECTION OF E646.

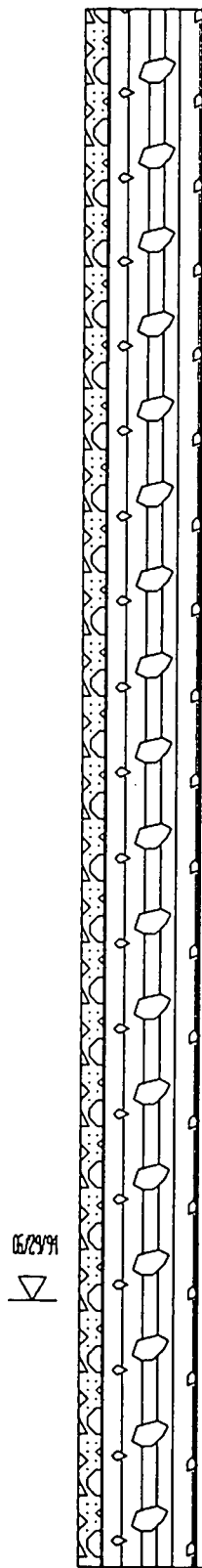
WELL OR  
PIEZOMETER  
CONSTRUCTION

LITHOLOGY

UNSATURATED SOILS  
CLASSIFICATION  
OR ROCK TYPE

DESCRIPTION

DATE	TIME	DEPTH (FT)	DEPTH (FT)	RECOVERY INTERVAL	PERCENT RECOVERY	SAMPLE GRAIN SIZE
6/28/94	14:00	6165	6166	100%	100%	100%
		6166	6167	100%	100%	100%
		6167	6168	100%	100%	100%
		6168	6169	100%	100%	100%
		6169	6170	100%	100%	100%
		6170	6171	100%	100%	100%
		6171	6172	100%	100%	100%
		6172	6173	100%	100%	100%
		6173	6174	100%	100%	100%



EAST: 2074267

AREA: WEST BUFFER ZONE

LOCATOR NUMBER: 0

GROUND ELEVATION (FT): 6184.60

CASING DIAMETER (IN): 2.00

BORE-HOLE DIAMETER (IN): 6.00

PROJECT NUMBER: WACD

GEOLOGIST: J.C. WRIGHT

DATE ORILED: 06/28/94

LOG OF BOREHOLE NUMBER:

11494

REMARKS: COEX, JEFF WRIGHT/JEFF WRIGHT. NOTE: GRAIN SIZE DIST., BEDDING, ANGULARITY, CEMENTATION, MOISTURE CONTENT, ETC. COULD NOT BE DETERM.

DUE TO DRILLING METHOD, CUTTINGS OBTAINED AT SURFACE DO NOT REPRESENT ACTUAL ALLUVIAL MATERIAL. DRILLING METHOD AND SAMPLE COLLECTION WERE AT DISCRETION OF ES&S.

[illegible]



LINEAL" BOTTLE LHM  
GRADATIONAL SAMPLE DEPTH  
SAMPLE NUMBER

[illegible]



DEPTH  
GRAVIMETRIC  
SAMPLE NUMBER

STATE PLANE COORDINATE: TOTAL DEPTH (FT): 69.50 GROUND ELEVATION (FT): 6184.60 PROJECT NUMBER: WAPP LOG OF BORING NUMBER:  
 NORTH: 748147 AREA: WEST BUFFER ZONE CASING DIAMETER (IN): 2.00 GEOLOGIST: J.C. WRIGHT 11494  
 EAST: 2074267 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 06/28/94  
 REMARKS: CODEX, JEFF WRIGHT/JEFF WRIGHT. NOTE: GRAIN SIZE TEST, BEDDING, ANGULARITY, CEMENTATION, MOISTURE CONTENT, ETC. COULD NOT BE DETERM.  
 DUE TO DRILLING METHOD. CUTTINGS OBTAINED AT SURFACE DO NOT REPRESENT ACTUAL ALLUVIAL MATERIAL. DRILLING METHOD AND SAMPLE COLLECTION WERE AT DIRECTION OF EG&G.

SAMPLE  
GRAIN  
SIZE

PERCENT  
RECOVERY

RECOVERY/  
INTERVAL

DATE (FT)  
DEPTH (FT)

WELL OR  
PIEZOMETER  
CONSTRUCTION

LITHOLOGY

UNIFIED SOILS  
CLASSIFICATION  
OR ROCK TYPE

DESCRIPTION

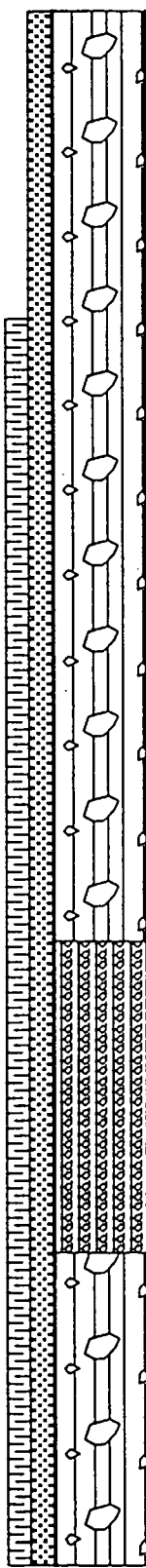
0

50

100

100

6125 6126 6127 6128 6129 6130 6131 6132 6133 6134 50



57:

56-58'  
Drill indicated finer grained zone. Penetration slowed to 15 in/foot. Probably a silty clayey sand.

58:

58-69'  
Same as 0-26.

STATE PLANE COORDINATE:	TOTAL DEPTH (FT): 69.50	GROUND ELEVATION (FT): 6184.60	PROJECT NUMBER: WAPP	LOG OF BORING NUMBER:
NORTH: 748147	AREA: WEST BUFFER ZONE	CASING DIAMETER (IN): 2.00	GEOLOGIST: J.C. WRIGHT	11494
EAST: 2374267	LOCATOR NUMBER: 0	BOREHOLE DIAMETER (IN): 6.00	DATE DRILLED: 06/28/94	

REMARKS: COEX, JEFF WRIGHT/JEFF WRIGHT. NOTE: GRAIN SIZE DIST., BEDDING, ANGULARITY, CEMENTATION, MOISTURE CONTENT, ETC. COULD NOT BE DETERM.  
 DUE TO DRILLING METHOD. CUTTINGS OBTAINED AT SURFACE DO NOT REPRESENT ACTUAL ALLUVIAL MATERIAL. DRILLING METHOD AND SAMPLE COLLECTION WERE AT DIRECTION OF EG&G.

DEPTH  
GRAVIMETRIC  
SAMPLE NUMBER

SAMPLE NUMBER

SAMPLE  
GRAIN  
SIZE

PERCENT  
RECOVERY

RECOVERY/  
INTERVAL

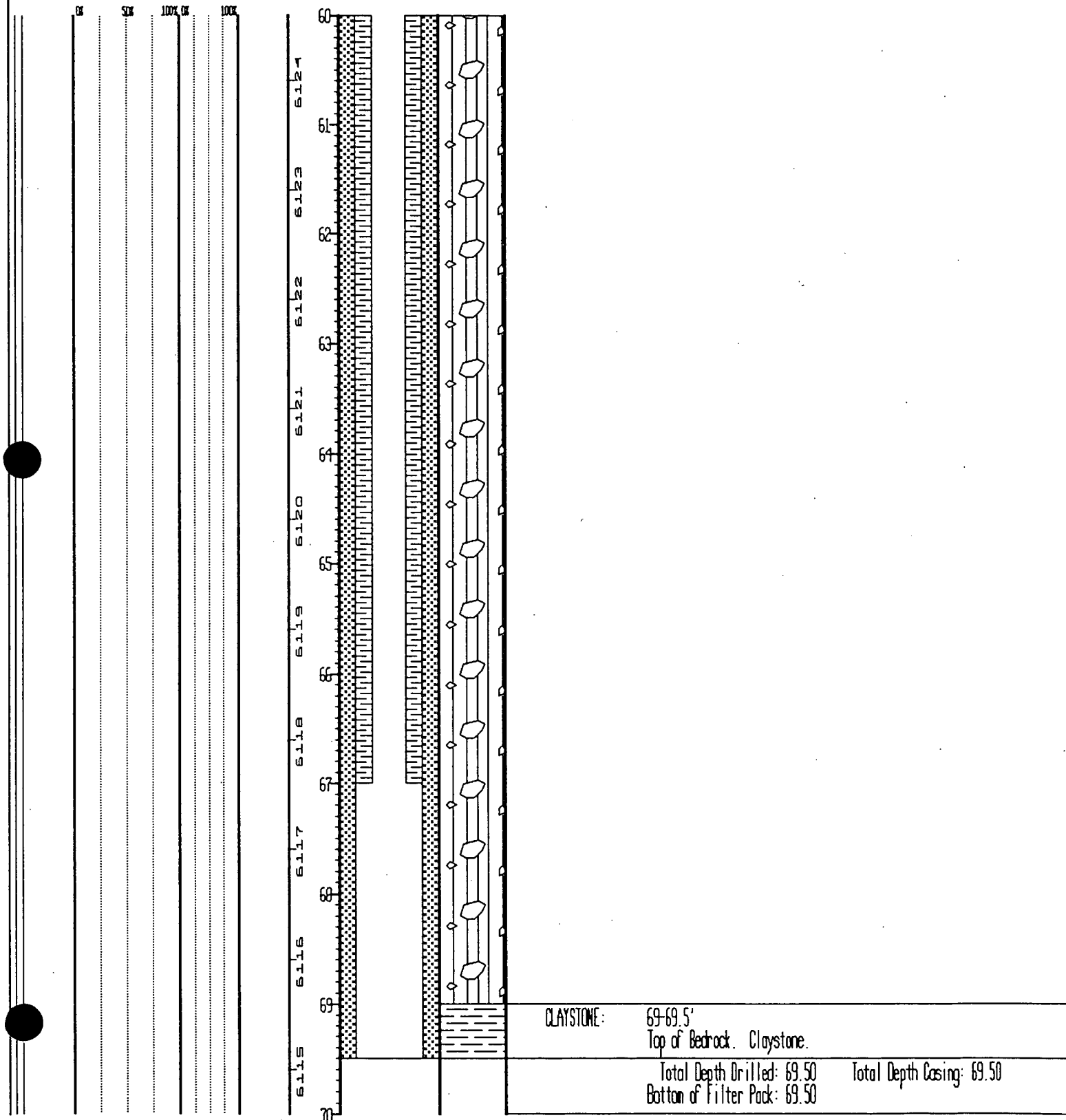
DATUM (FT)  
DEPTH (FT)

WELL OR  
PIEZOMETER  
CONSTRUCTION

LITHOLOGY

UNIFIED SOILS  
CLASSIFICATION  
OR ROCK TYPE

DESCRIPTION



STATE PLANE COORDINATE: TOTAL DEPTH (FT): 65.90 GROUND ELEVATION (FT): 6113.60 PROJECT NUMBER: WPP LOG OF BORING NUMBER: 11594  
 NORTH: 751604 AREA: WEST BUFFER ZONE CASING DIAMETER (IN): 2.00 GEOLOGIST: A. WILCINSKI  
 EAST: 2075705 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 07/06/94  
 REMARKS: COCK, A.G. WILCINSKI/J.C. WRIGHT. NOTE: SPLIT SPOON SAMPLES WERE TAKEN AT LITHOLOGY CHANGES AS IDENTIFIED BY DRILLING METHOD. NO ANALYTICAL SAMPLES TAKEN. DRILL CUTTINGS TAKEN AT EVERY 5 FEET, BUT NOT LOGGED.

DEPTH (FT) SAMPLE SIZE PERCENT RECOVERY INTERVAL DATUM (FT) WELL OR PIEZOMETER CONSTRUCTION LITHOLOGY UNSATURATED SOILS CLASSIFICATION OR ROCK TYPE DESCRIPTION

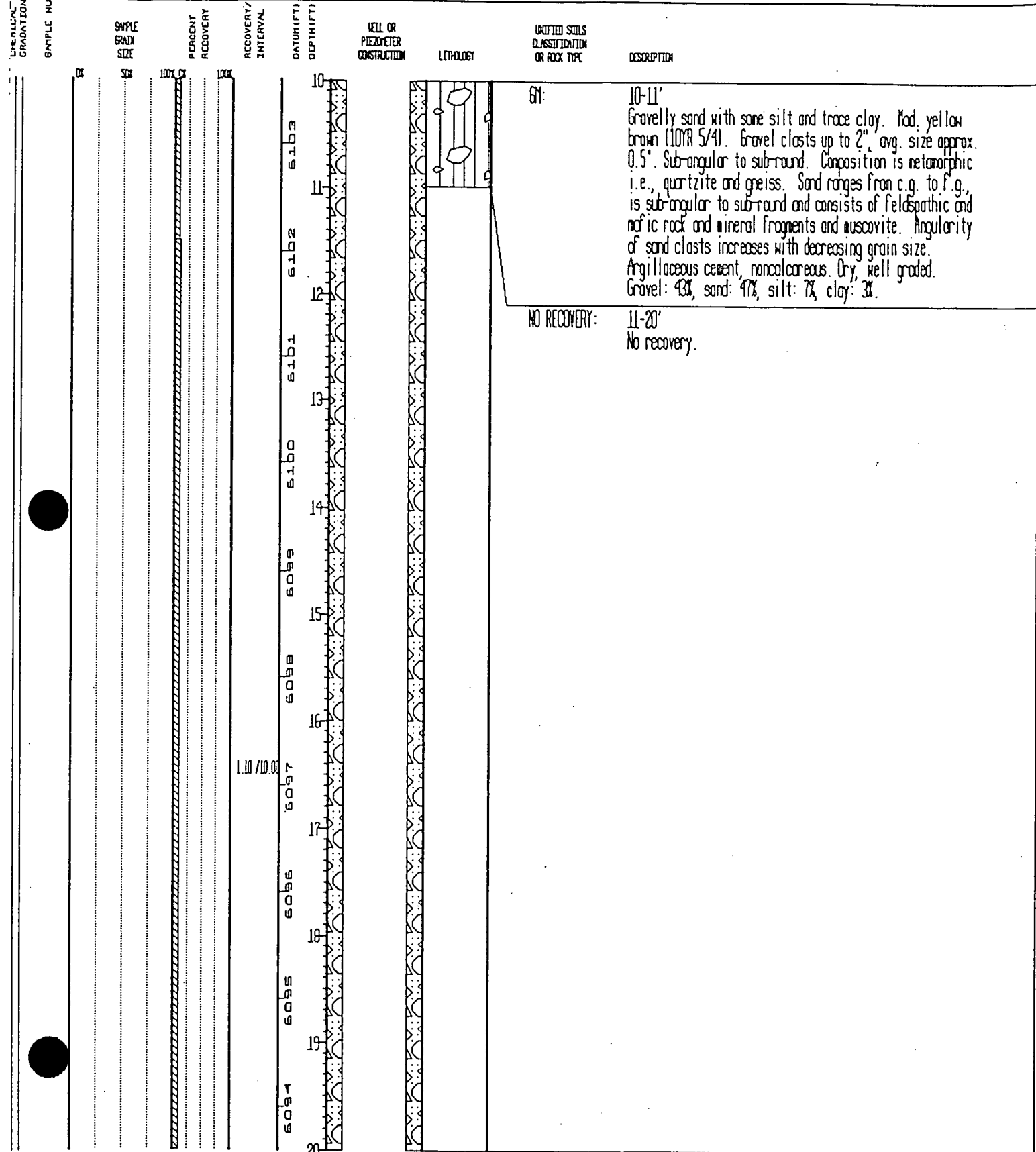
NO RECOVERY: 0-10'  
 No recovery.

1.00 / 11.5

61b1 61b5 61b6 61b7 61b8 61b9 61c0 61c1 61c2 61c3

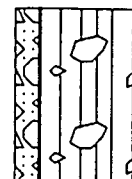
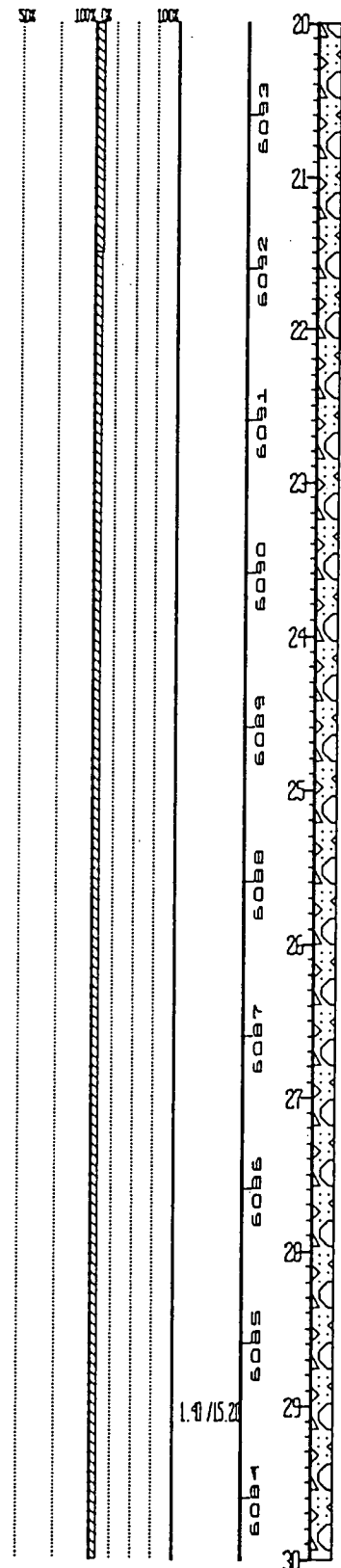
STATE PLANE COORDINATE:	TOTAL DEPTH (FT): 65.90	GROUND ELEVATION (FT): 6113.60	PROJECT NUMBER: WAP	LOG OF BORING NUMBER:
NORTH: 751604	AREA: WEST BUFFER ZONE	CASING DIAMETER (IN): 2.00	GEOLOGIST: A. WILCINSKI	11594
EAST: 2075705	LOCATOR NUMBER: 0	BOREHOLE DIAMETER (IN): 6.00	DATE DRILLED: 07/06/94	
REMARKS: CODEX, A.G. WILCINSKI/J.C. WRIGHT. NOTE: SPLIT SPOON SAMPLES WERE TAKEN AT LITHOLOGY CHANGES AS IDENTIFIED BY DRILLING METHOD. NO ANALYTICAL SAMPLES TAKEN. DRILL CUTTINGS TAKEN AT EVERY 5 FEET, BUT NOT LOGGED.				

VERTICAL SCALE: 1" = 10' DEPTH  
 GRADATIONAL SAMPLE DEPTH  
 SAMPLE NUMBER



STATE PLANE COORDINATE: TOTAL DEPTH (FT): 65.90 GROUND ELEVATION (FT): 6113.60 PROJECT NUMBER: WHP LOG OF BORING NUMBER: 11594  
 NORTH: 751604 AREA: WEST BUFFER ZONE CASING DIAMETER (IN): 2.00 GEOLOGIST: A. WILCINSKI  
 EAST: 2075705 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 07/06/94  
 REMARKS: COCK, A.G. WILCINSKI/J.C. WRIGHT. NOTE: SPLIT SPOON SAMPLES WERE TAKEN AT LITHOLOGY CHANGES AS IDENTIFIED BY DRILLING METHOD. NO ANALYTICAL SAMPLES TAKEN. DRILL CUTTINGS TAKEN AT EVERY 5 FEET, BUT NOT LOGGED.

DEPTH (FT) DATE (MM/DD) WELL OR PIEZOMETER CONSTRUCTION LITHOLOGY UNIFIED SOILS CLASSIFICATION OR ROCK TYPE DESCRIPTION



61:

20-21.1'

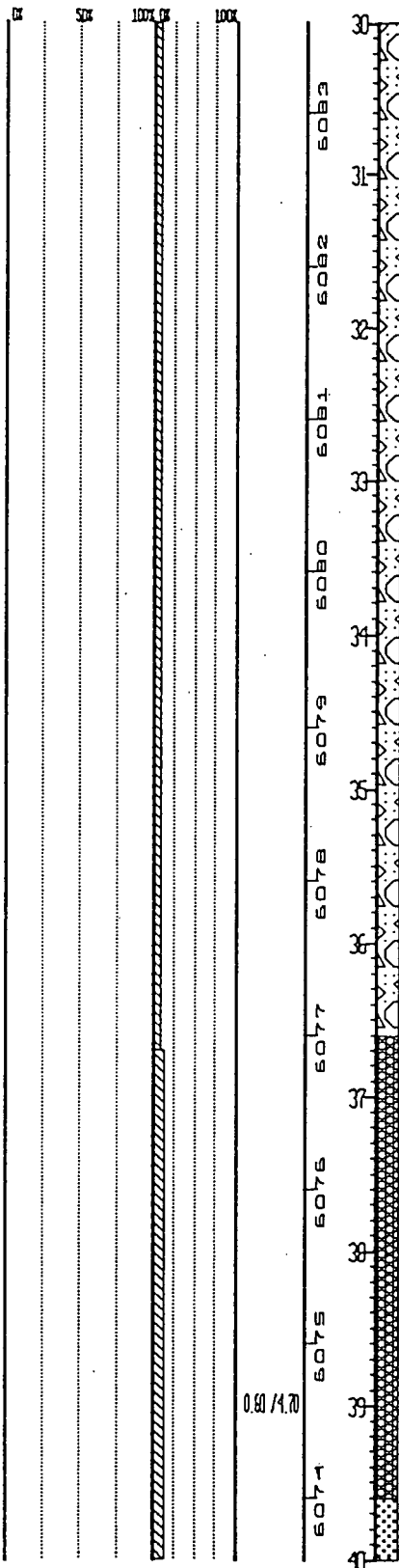
Sandy gravel with some silt and trace clay. Mod. yellow brown (10YR 5/4). Gravel clasts up to 2", avg. size approx. 0.5". Sub-angular to sub-round. Composition is metamorphic i.e., quartzite, and gneiss. Sand ranges from c.g. to f.g. sub-angular to sub-round, consists of quartzite, quartz, muscovite and quartzofeldspathic rock fragments. Angularity of sand clasts increases with decreasing grain size. Argillaceous cement, noncalcareous, well graded, dry. Gravel: 48%, sand: 40%, silt: 8%, clay: 4%.

NO RECOVERY:

21.1-35.2'  
No recovery.

STATE PLANE COORDINATE: TOTAL DEPTH (FT): 65.90 GROUND ELEVATION (FT): 6113.60 PROJECT NUMBER: WAPP LOG OF BORING NUMBER: 11594  
 NORTH: 751604 AREA: WEST BUFFER ZONE CASING DIAMETER (IN): 2.00 GEOLOGIST: A. WILCINSKI  
 EAST: 2075705 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 07/05/94  
 REMARKS: CODEX, A.G. WILCINSKI/J.C. WRIGHT. NOTE: SPLIT SPOON SAMPLES WERE TAKEN AT LITHOLOGY CHANGES AS IDENTIFIED BY DRILLING METHOD. NO ANALYTICAL SAMPLES TAKEN. DRILL CUTTINGS TAKEN AT EVERY 5 FEET, BUT NOT LOGGED.

CHEMICAL SAMPLE DEPTH  
 GRADATIONAL SAMPLE DEPTH  
 SAMPLE NUMBER  
 SAMPLE GRAIN SIZE  
 PERCENT RECOVERY  
 RECOVERY/INTERVAL  
 DATE (FT)  
 DEPTH (FT)  
 WELL OR PIEZOMETER CONSTRUCTION  
 LITHOLOGY  
 UNIFIED SOILS CLASSIFICATION OR ROCK TYPE  
 DESCRIPTION



SY: 35.2-36.6'  
 Silty sand with some clay and some gravel. Mod. brown (SYR 3/4). Gravel clasts up to approx. 1", avg. size approx. 0.5". Sub-angular to sub-round. Composition is metamorphic including quartzite and mafic materials derived from gneissic terraine. Sand ranges from c.g. to f.g. with n.g. and f.g. predominating. Composition similar to that of gravel. Argillaceous cement, noncalcareous, well graded. Moist. Bottom 0.4 ft. has increasing gravel content. Gravel: 13%, sand: 61%, silt: 16%, clay: 10%

NO RECOVERY:  
 36.6-39.9'  
 No recovery.

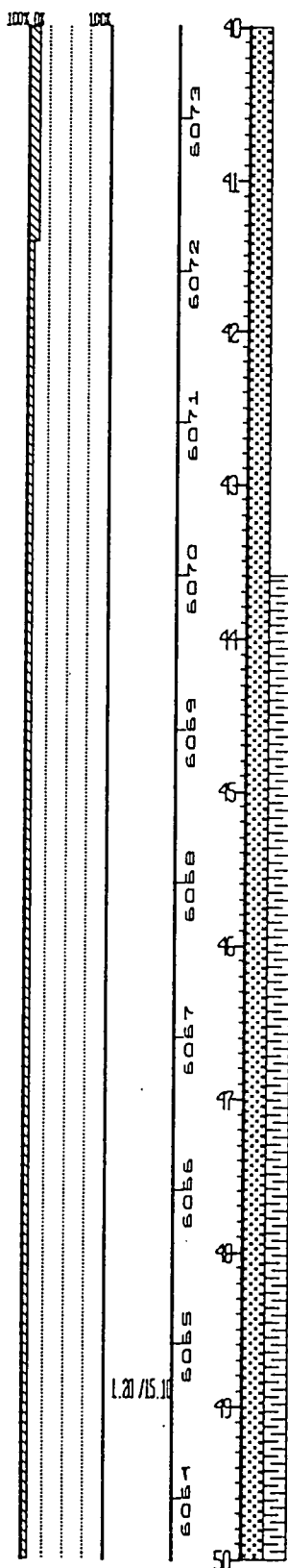
GY: 39.9-40.5'  
 Gravelly sand with some silt and trace clay. Mod. brown (SYR 4/4). Gravel is sub-angular to sub-round, up to approx. 2", avg. approx. 0.5". Composition is metamorphic i.e., quartzite, quartz, micaceous quartzite. Sand ranges from c.g. to f.g. in approx. equal amounts. It is sub-angular to sub-round; composition is quartzofeldspathic with approx. 5% dark mineral grains. Angularity of sand increases with decreasing grain size. Well graded, argillaceous cement, noncalcareous. Moist. Gravel: 40%, sand: 47%, silt: 9%, clay: 4%.



STATE PLANE COORDINATE: TOTAL DEPTH (FT): 65.90 GROUND ELEVATION (FT): 6113.60 PROJECT NUMBER: WAPP LOG OF BORING NUMBER:  
 NORTH: 751604 AREA: WEST BUFFER ZONE CASING DIAMETER (IN): 2.00 GEOLOGIST: A. WILCINSKI  
 EAST: 2075705 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 07/06/94  
 REMARKS: CODEX, A.G. WILCINSKI/J.C. WRIGHT. NOTE: SPLIT SPOON SAMPLES WERE TAKEN AT LITHOLOGY CHANGES AS IDENTIFIED BY DRILLING METHOD. NO ANALYTICAL SAMPLES TAKEN. DRILL CUTTINGS TAKEN AT EVERY 5 FEET, BUT NOT LOGGED.

11594

UNWEIGHED SAMPLE DEPTH  
 GRADATIONAL SAMPLE DEPTH  
 SAMPLE NUMBER  
 SAMPLE GRAIN SIZE  
 PERCENT RECOVERY  
 RECOVERY INTERVAL  
 DATE (FT)  
 DEPTH (FT)  
 WELL OR PIEZOMETER CONSTRUCTION  
 LITHOLOGY  
 UNIFIED SOILS CLASSIFICATION OR ROCK TYPE  
 DESCRIPTION



NO RECOVERY: 40.5-55'  
 No recovery.

11594

SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/ INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNITED STATES CLASSIFICATION OR ROCK TYPE	DESCRIPTION
50	100%	100%		50				
				50.5				
				51				
				51.5				
				52				
				52.5				
				53				
				53.5				
				54				
				54.5				
				55				
				55.5				
				56				
				56.5				
				57				
				57.5				
				58				
				58.5				
				59				
				59.5				
				60				
				60.5				
				61				
				61.5				
				62				
				62.5				
				63				
				63.5				
				64				
				64.5				
				65				
				65.5				
				66				
				66.5				
				67				
				67.5				
				68				
				68.5				
				69				
				69.5				
				70				
				70.5				
				71				
				71.5				
				72				
				72.5				
				73				
				73.5				
				74				
				74.5				
				75				
				75.5				
				76				
				76.5				
				77				
				77.5				
				78				
				78.5				
				79				
				79.5				
				80				
				80.5				
				81				
				81.5				
				82				
				82.5				
				83				
				83.5				
				84				
				84.5				
				85				



## STATE PLANE COORDINATE:

NORTH:

75570

EAST:

288507

TOTAL DEPTH (FT): 20.20

AFCI-NORTH BUFFER ZONE

LOCATION NUMBER: 0

GROUND ELEVATION (FT): 5956.20

CASING DIAMETER (IN): 2.00

BOREHOLE DIAMETER (IN): 8.20

PROJECT NUMBER:

WAPP

ACQUISITION:

K.R. MOTTISH

DATE DRILLED:

08/22/94

LOG OF BORING NUMBER:

11694

REMARKS: KULLOUSTEN ALBER, K.R. MOTTISH/J.C. WRIGHT - TEST WELL BUILT WITH 2.0" AND 4.0" ODS SPEERS WITH A 4'-60 OAL SHOWN BETWEEN SECT

SAMPLE NUMBER

SAMPLE SIZE

PERCENT RECOVERY

RECOVERY INTERVAL

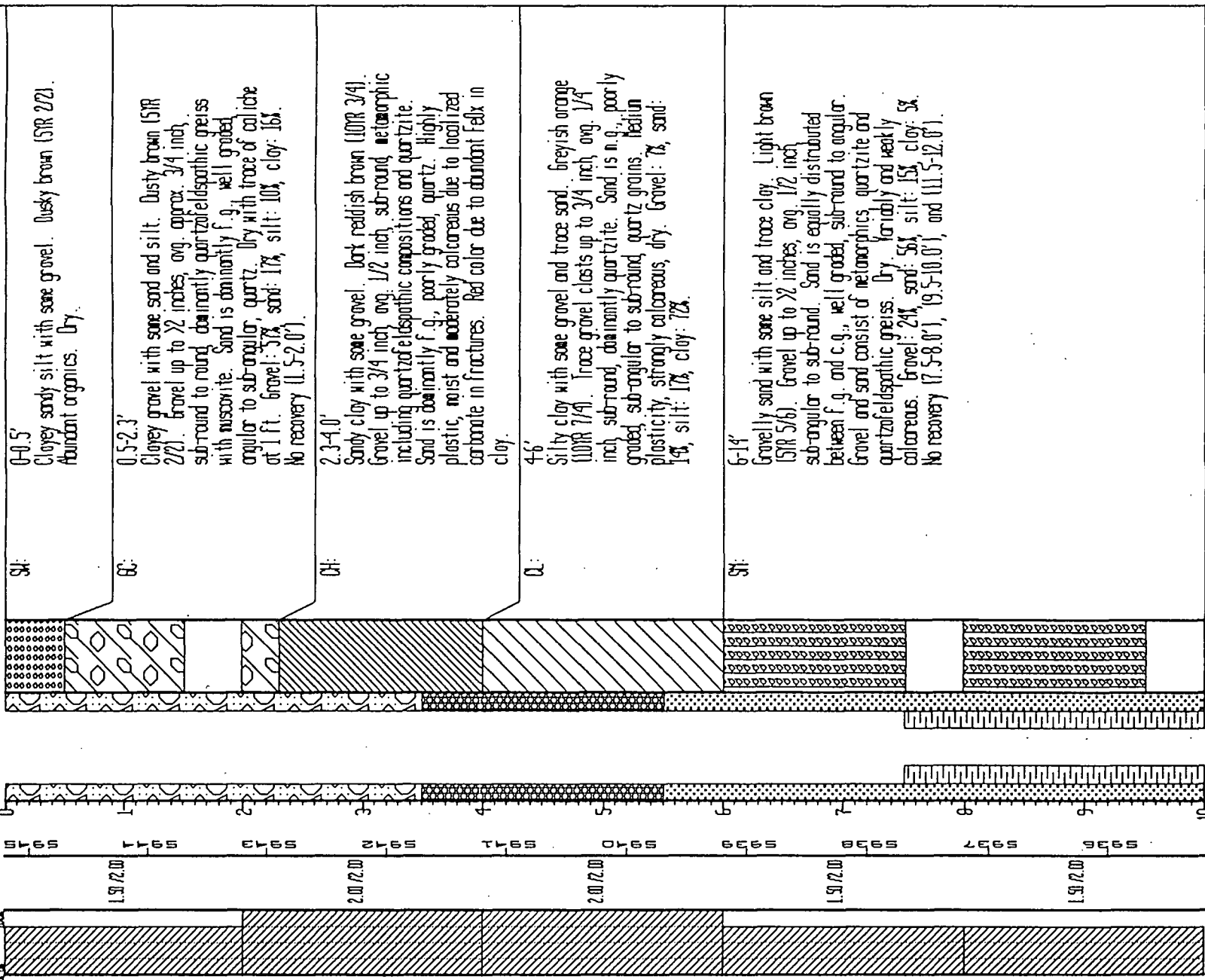
DATE (YR)

WELL OR  
PIEZOMETER  
CONSTRUCTION

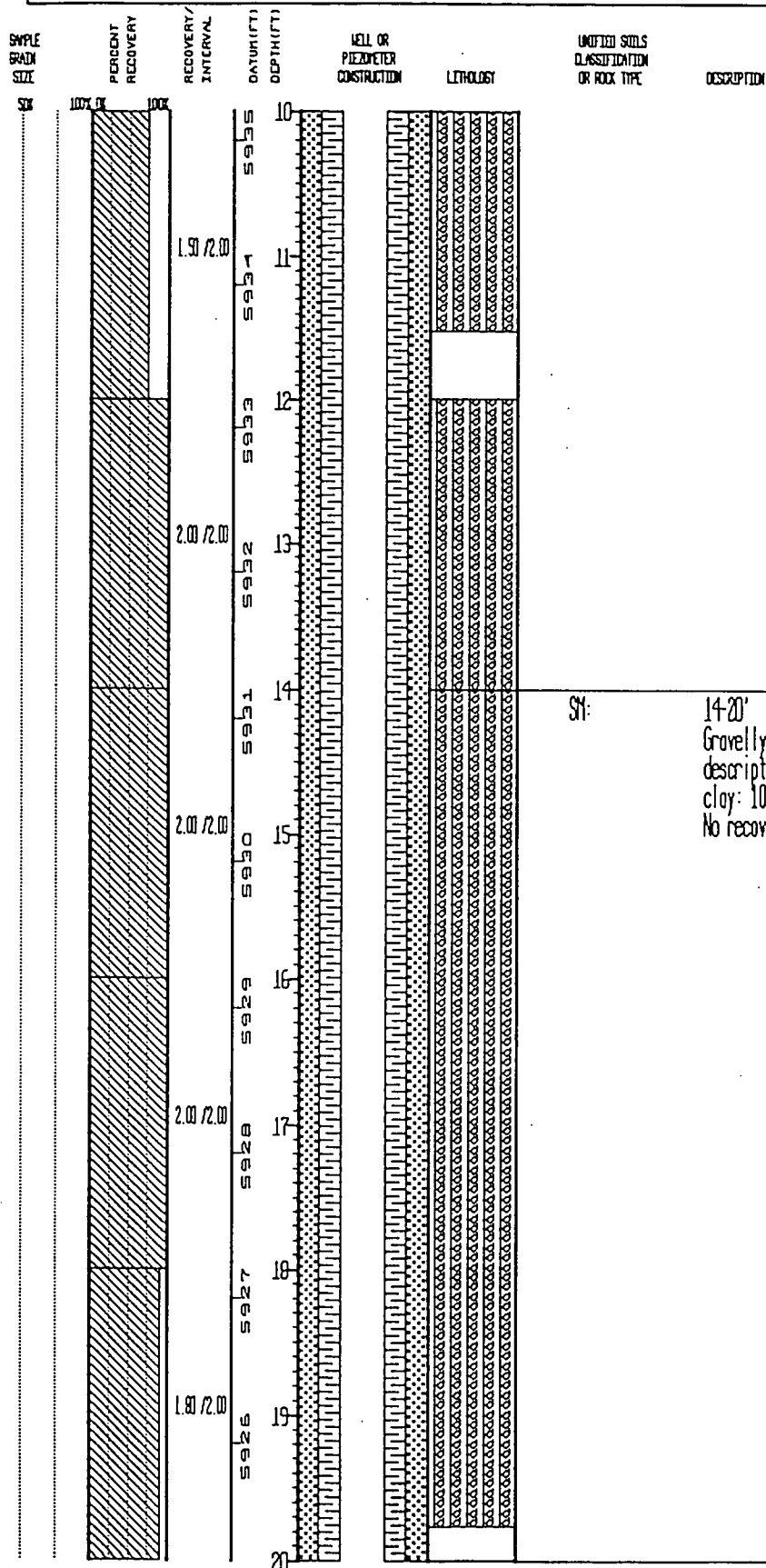
LITHOLOGY

UNITED STATES  
CLASSIFICATION  
OR ROCK TYPE

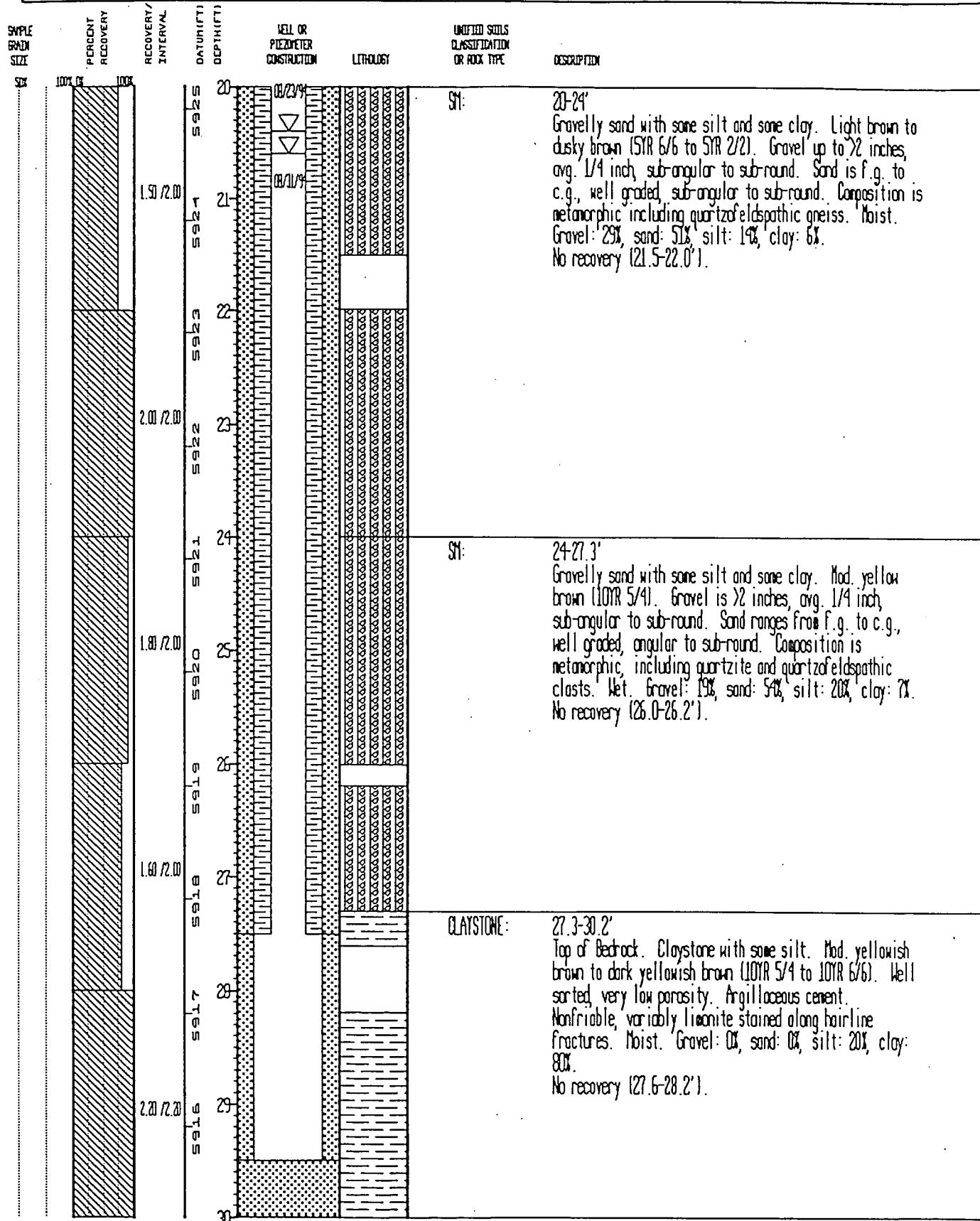
DESCRIPTION



STATE PLANE COORDINATE: TOTAL DEPTH (FT): 30.20 GROUND ELEVATION (FT): 5945.20 PROJECT NUMBER: WRP LOG OF BORING NUMBER: 11694  
 NORTH: 755770 AREA: NORTH BUFFER ZONE CASING DIAMETER (IN): 2.00 GEOLOGIST: K.R. MIYOSHI  
 EAST: 2085007 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 8.20 DATE DRILLED: 08/23/94  
 REMARKS: HOLLOWSTEM AUGER, K.R. MIYOSHI/J.C. WRIGHT -TEST WELL BUILT WITH 2.0" AND 4.0" .008 SCREENS WITH A 40-60 DUAL SANDPACK IN BETWEEN SCREEN

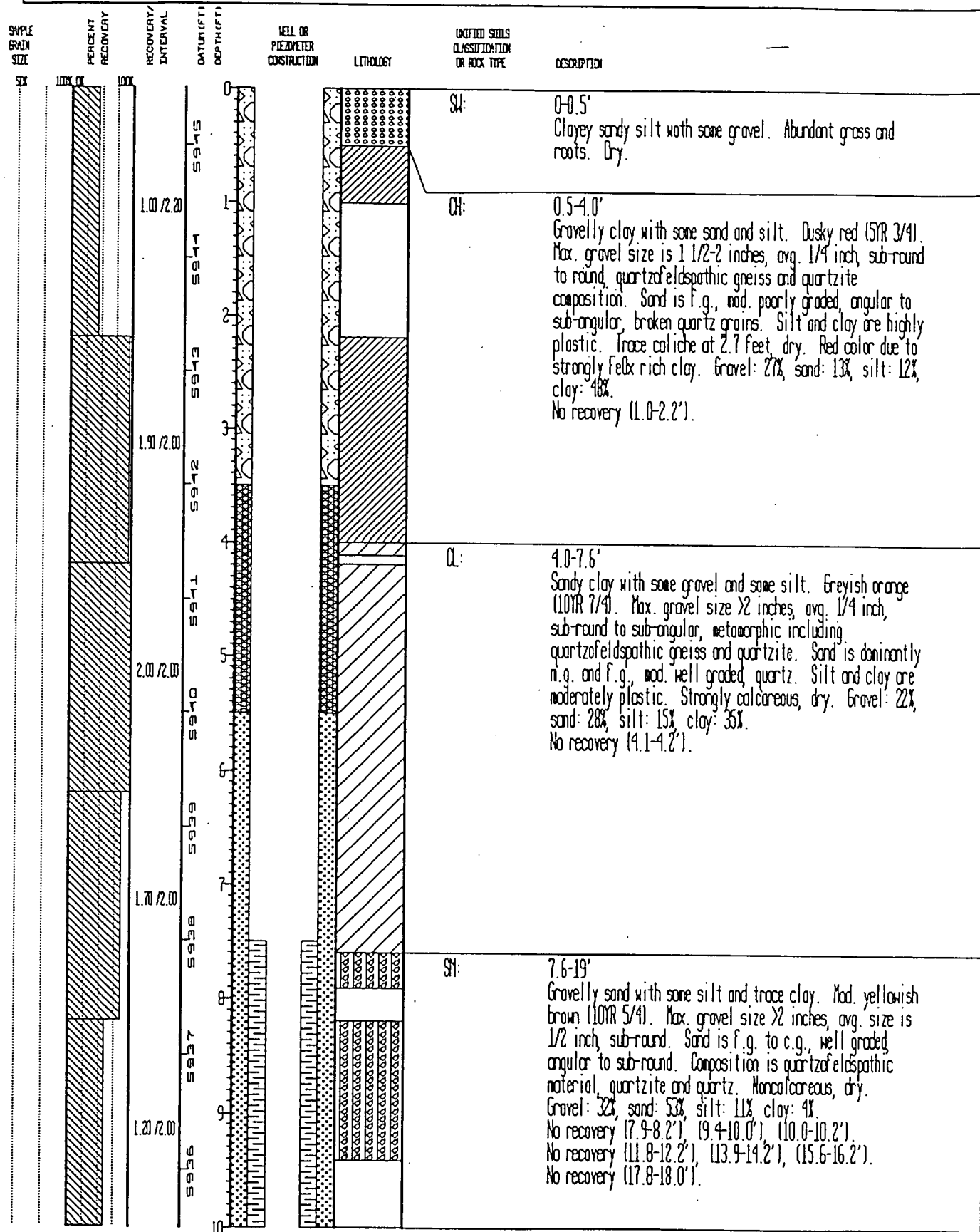


STATE PLANE COORDINATE: TOTAL DEPTH (FT): 30.20 GROUND ELEVATION (FT): 5945.20 PROJECT NUMBER: WHP LOG OF BORING NUMBER: 11694  
 NORTH: 755770 AREA: NORTH BUFFER ZONE CASING DIAMETER (IN): 2.00 GEOLOGIST: K.R. MATOSHI  
 EAST: 2085007 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 8.20 DATE DRILLED: 08/22/94  
 REMARKS: HOLLOWSTEN AUGER, K.R. MATOSHI/J.C. WRIGHT - TEST WELL BUILT WITH 2.0" AND 4.0" .008 SCREENS WITH A 40-60 OVAL SANDPACK BETWEEN SCREES





STATE PLANE COORDINATE: TOTAL DEPTH (FT): 30.00 GROUND ELEVATION (FT): 5945.50 PROJECT NUMBER: WAPP LOG OF BORING NUMBER: 11794  
 NORTH: 755760 AREA: NORTH BUFFER ZONE CASING DIAMETER (IN): 2.00 GEOLOGIST: K.R. MIYOSHI  
 EAST: 2085007 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 8.50 DATE DRILLED: 08/26/94  
 REMARKS: HOLLOWSTERN AUGER, K.R. MIYOSHI/J.C. WRIGHT -TEST WELL BUILT WITH 2.0" .006 SCREEN WITH A 30-70 SAND FILTER PACK.





VERTICAL SAMPLE DEPTH  
GRADATIONAL SAMPLE DEPTH  
SAMPLE NUMBER

SAMPLE  
SIZE  
BRAND

PERCENT  
RECOVERY

RECOVERY/  
INTERVAL

DURATION/  
DEPTH(FT)

WELL OR  
CONSTRUCTION

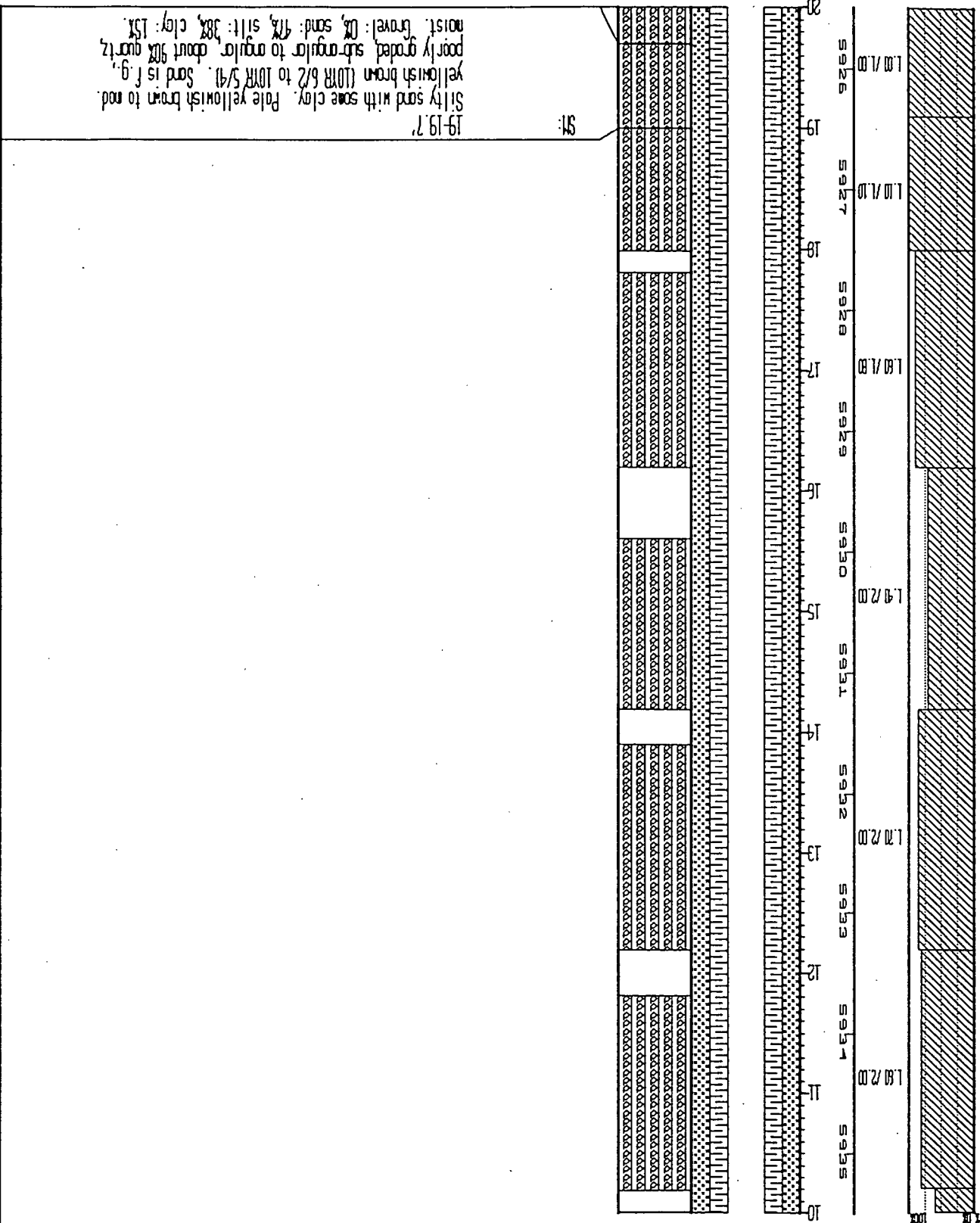
LITHOLOGY

UNITED STATES  
CLASSIFICATION  
OR ROCK TYPE

DESCRIPTION

STATE PLANE COORDINATE: 755760 NORTH: 2085007  
 TOTAL DEPTH (FT): 30.00 LOCATION NUMBER: 0  
 AREA: NORTH BUFFER ZONE  
 GROUND ELEVATION (FT): 5965.50 BORING DIAMETER (IN): 2.00  
 PROJECT NUMBER: WPP DATE DRILLED: 08/25/94  
 GEOLOGIST: K.R. MORTSHAW  
 LOG OF BORING NUMBER: 11794

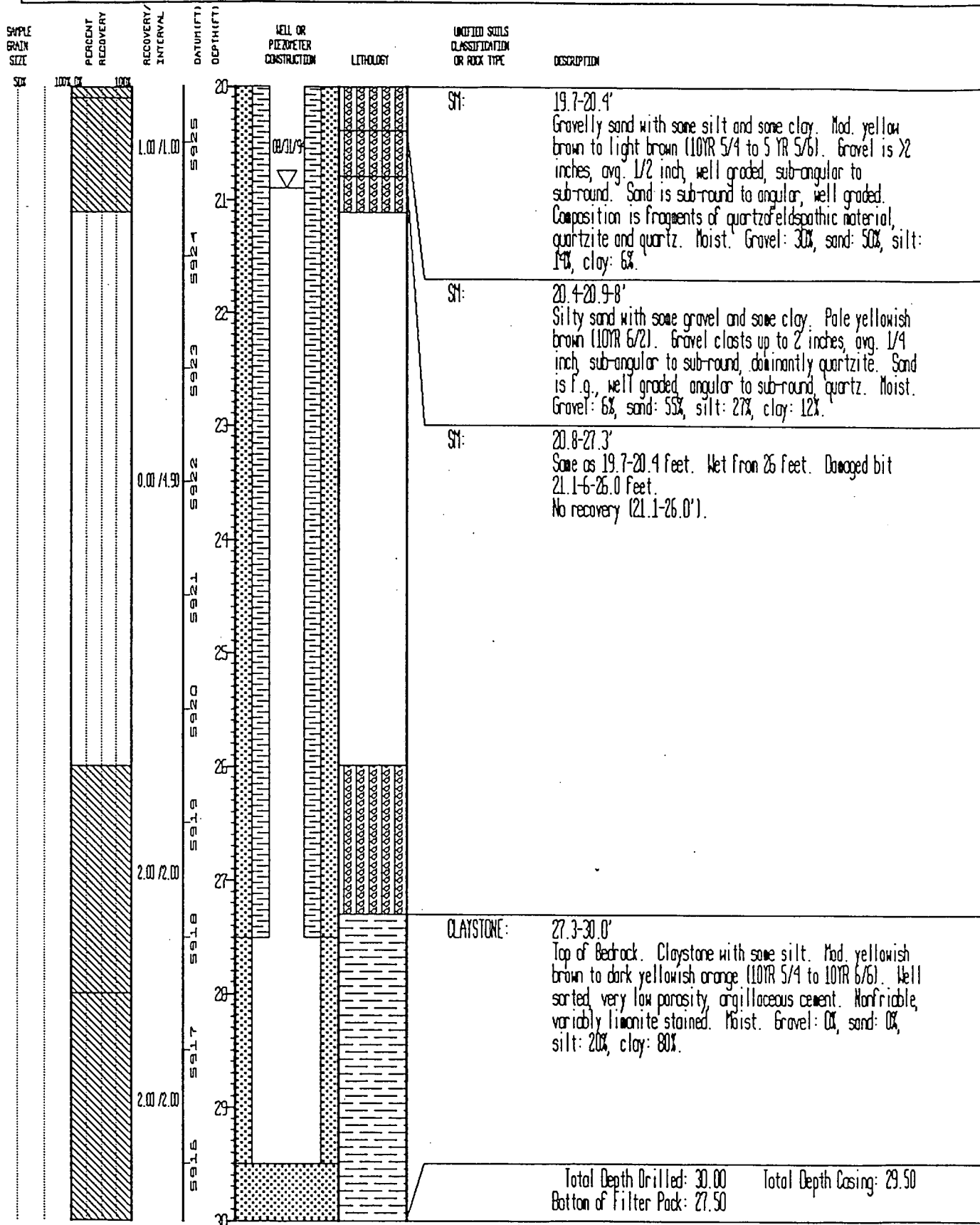
REMARKS: HOLLOWSTEM AUGER, K.R. MORTSHAW/J.C. WRIGHT - TEST WELL BUILT WITH 2.0" .006 SPEEEN WITH A 30-70 SAND FILTER PACK.



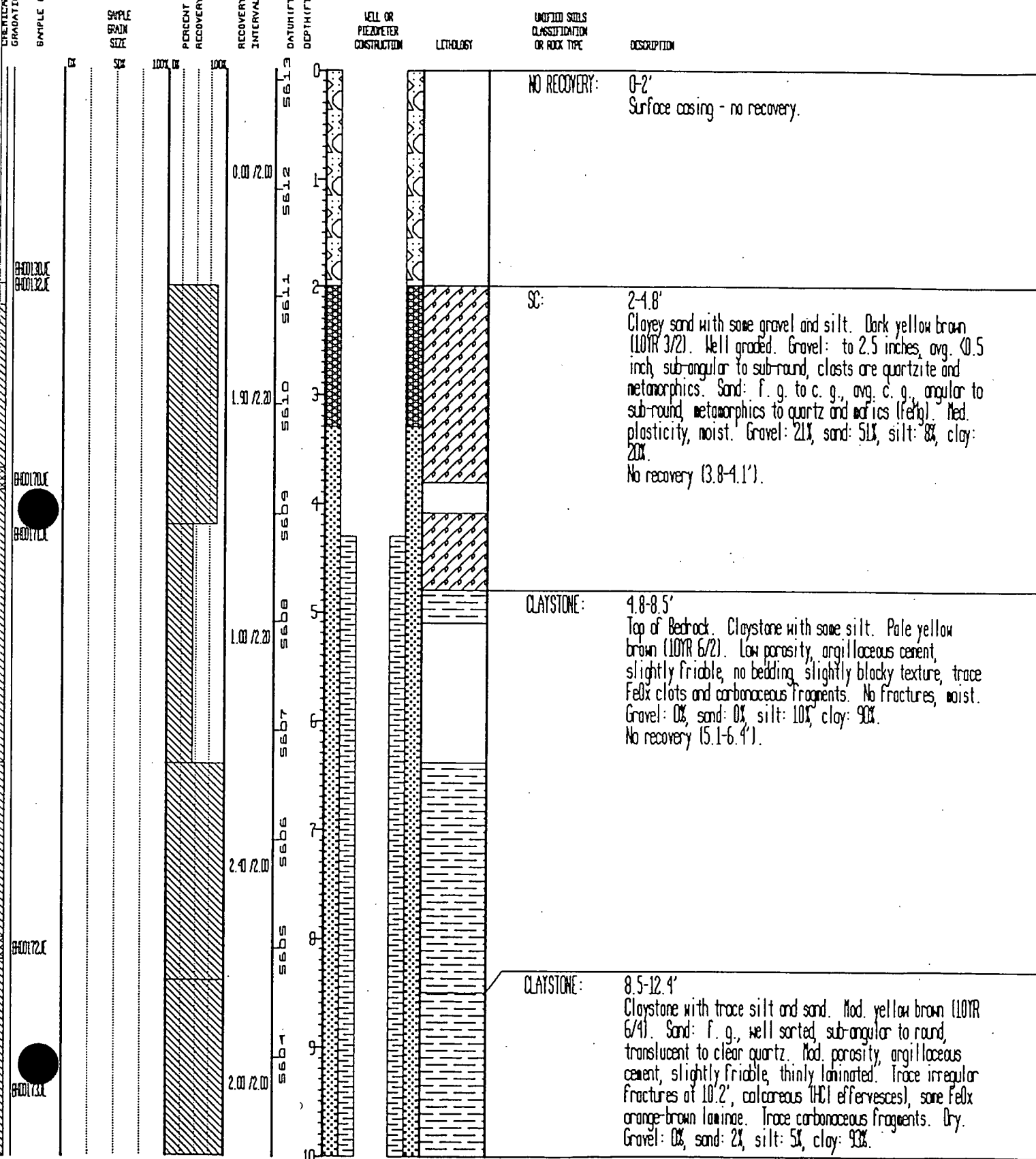
Silty sand with some clay. Pale yellowish brown to red. Yellowish brown (10R 6/2 to 10R 5/4). Sand is f.g. poorly graded, sub-angular to angular, about 90% quartz, moist. Gravel: 0%, sand: 47%, silt: 38%, clay: 15%.

STATE PLANE COORDINATE: NORTH: 755760 EAST: 2085007 TOTAL DEPTH (FT): 30.00 AREA: NORTH BUFFER ZONE LOCATOR NUMBER: 0 GROUND ELEVATION (FT): 5945.50 CASING DIAMETER (IN): 2.00 BOREHOLE DIAMETER (IN): 8.50 PROJECT NUMBER: WAPP GEOLOGIST: K.R. MIYOSHI DATE DRILLED: 08/25/94 LOG OF BORING NUMBER: 11794

REMARKS: HOLLOWSTEM AUGER, K.R. MIYOSHI/J.C. WRIGHT - TEST WELL BUILT WITH 2.0" LOG SCREEN WITH A 30-70 SAND FILTER PACK.

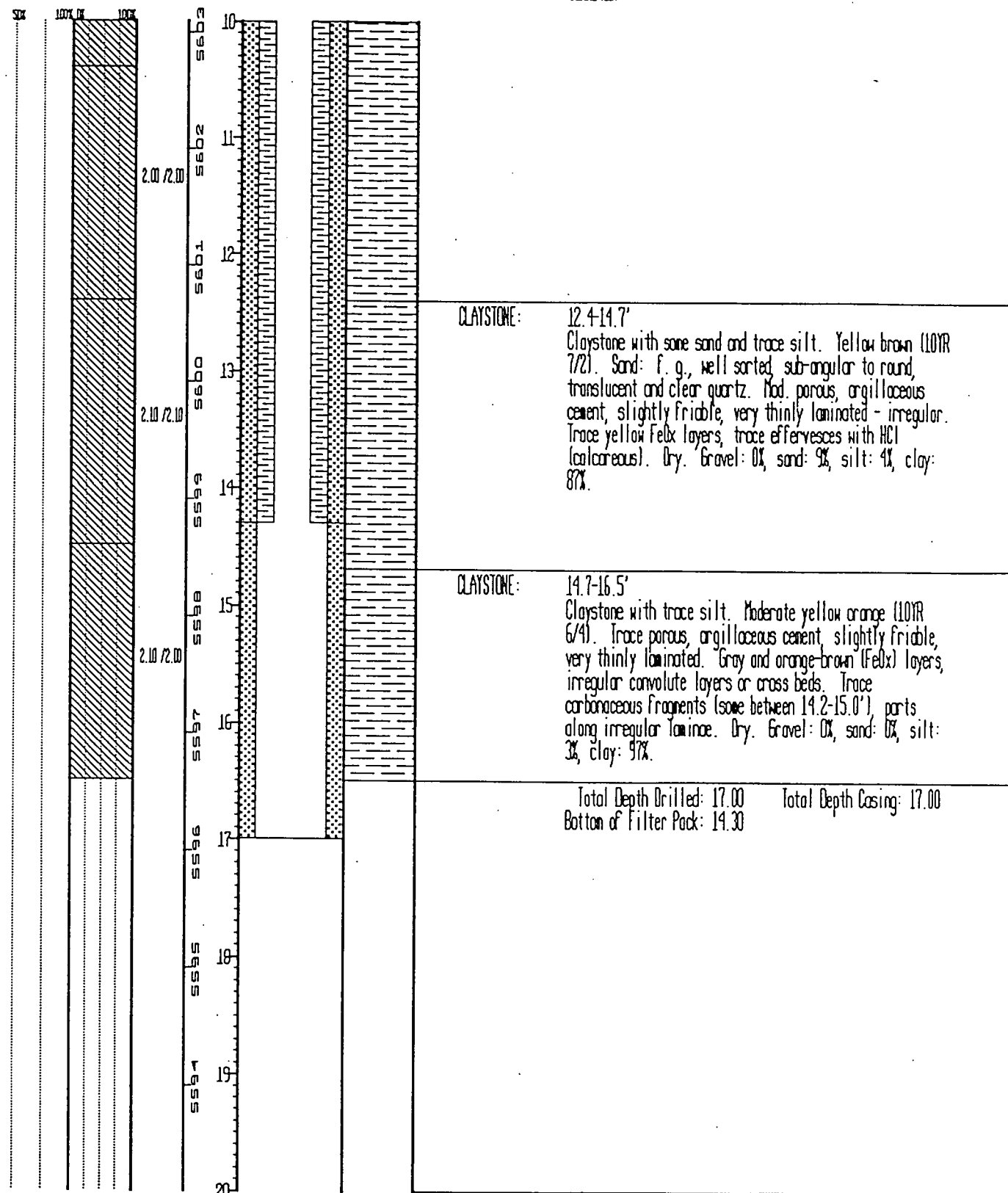


STATE PLANE COORDINATE: TOTAL DEPTH (FT): 17.00 GROUND ELEVATION (FT): 5613.10 PROJECT NUMBER: WHP LOG OF BORING NUMBER: 11894  
 NORTH: 752860 AREA: EAST OF INDIANA CASTING DIAMETER (IN): 2.00 GEOLOGIST: K.R. MYOSHI  
 EAST: 2095258 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 07/14/94  
 REMARKS: HOLLOWSTEN AUGER/SPLIT SPOON, K.R. MYOSHI/A.G. WELCINSKI



STATE PLANE COORDINATE: TOTAL DEPTH (FT): 17.00 GROUND ELEVATION (FT): 5613.10 PROJECT NUMBER: WAPP LOG OF BORING NUMBER: 11894  
 NORTH: 752860 AREA: EAST OF INDIANA CASING DIAMETER (IN): 2.00 GEOLOGIST: K.R. MIYOSHI  
 EAST: 2095268 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 07/14/94  
 REMARKS: HOLLOWSTEM AUGER/SPLIT SPOON, K.R. MIYOSHI/A.G. WILCINSKI

CHEMICAL ANALYSIS DEPTH  
 GRADATIONAL SAMPLE DEPTH  
 SAMPLE NUMBER  
 SAMPLE GRAIN SIZE  
 PERCENT RECOVERY  
 RECOVERY INTERVAL  
 DATUM (FT)  
 DEPTH (FT)  
 WELL OR PIEZOMETER CONSTRUCTION  
 LITHOLOGY  
 UNIFIED SOILS CLASSIFICATION OR ROCK TYPE  
 DESCRIPTION



STATE PLANE COORDINATE: TOTAL DEPTH (FT): 8.40  
 NORTH: 753276 AREA: EAST OF INDIANA  
 EAST: 2094758 LOCATOR NUMBER: 0  
 REMARKS: HOLLOWSTEN AUGER-SPLIT SPOON, K.R. MIYOSHI/A.G. KILCINSKI

GROUND ELEVATION (FT): 5625.30  
 CASING DIAMETER (IN): 20.00  
 BOREHOLE DIAMETER (IN): 6.00

PROJECT NUMBER: WAPP  
 GEOLOGIST: K.R. MIYOSHI  
 DATE DRILLED: 07/14/94

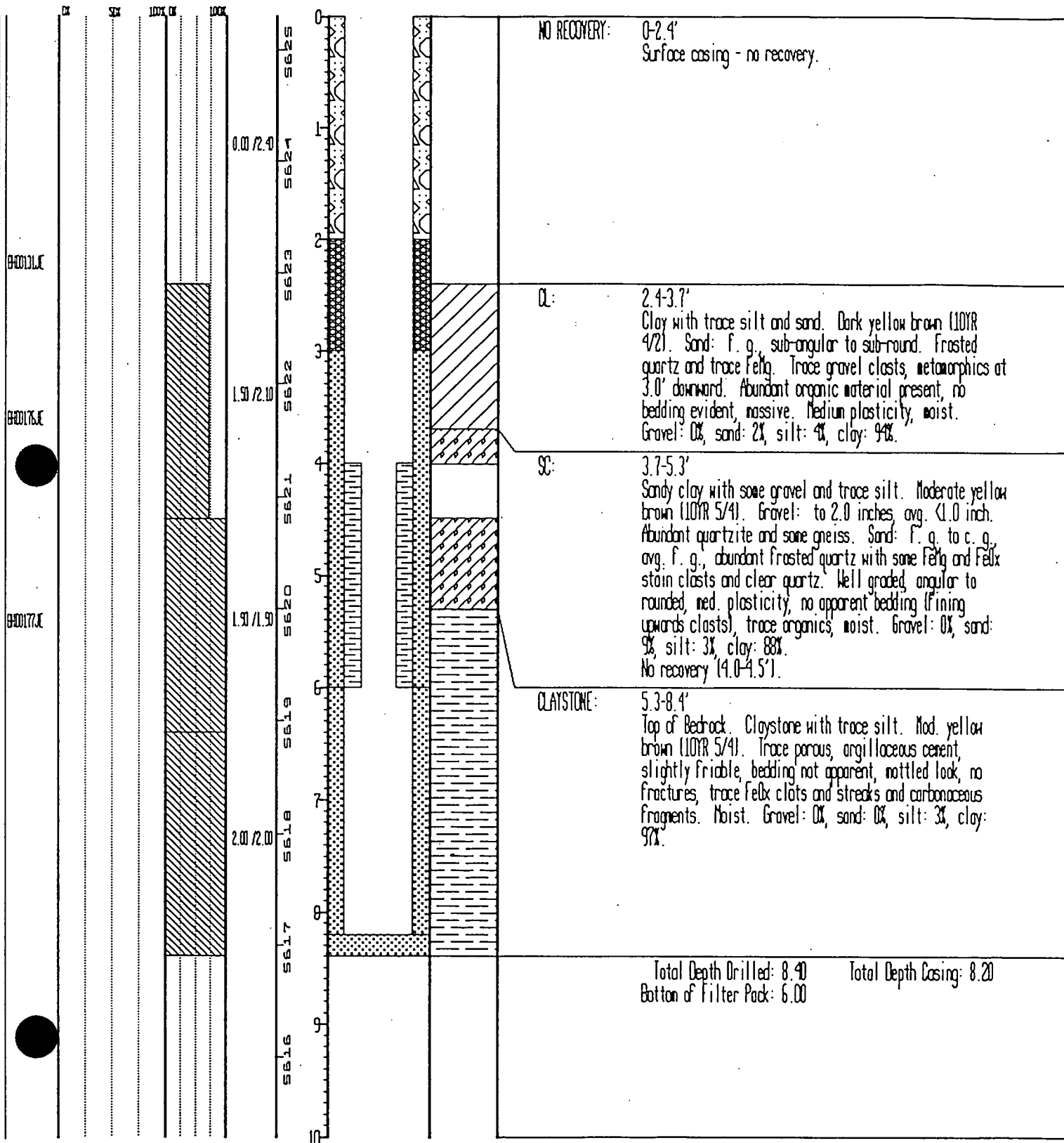
LOG OF BORING NUMBER:

11994

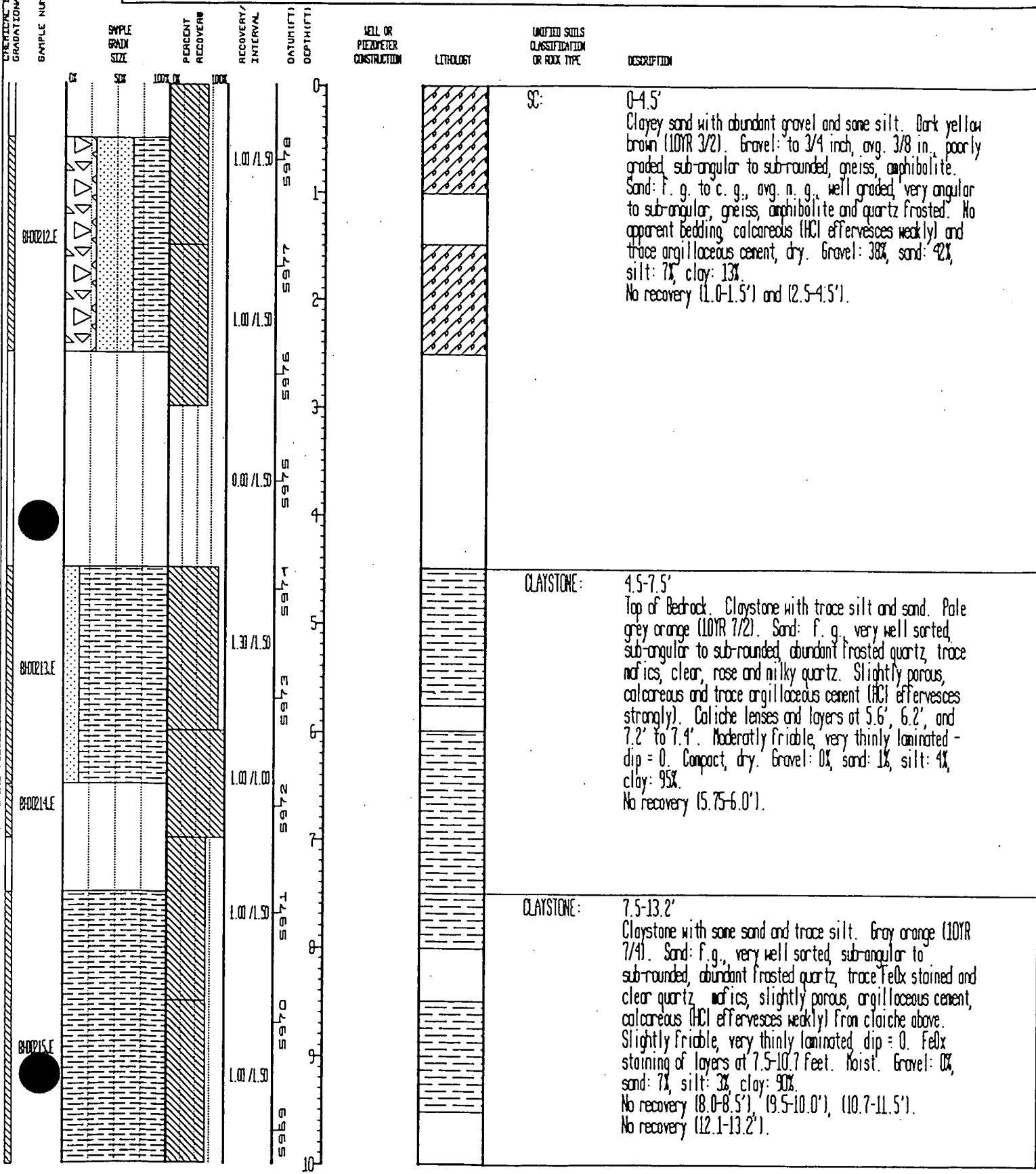
GRAND TOTAL BATHY DEPTH

BATHY NUMBER

SAMPLE GRAIN SIZE PERCENT RECOVERY RECOVERY INTERVAL DATE (FT) DEPTH (FT) WELL OR PIEZOMETER CONSTRUCTION LITHOLOGY UNIFIED SOILS CLASSIFICATION OR ROCK TYPE DESCRIPTION



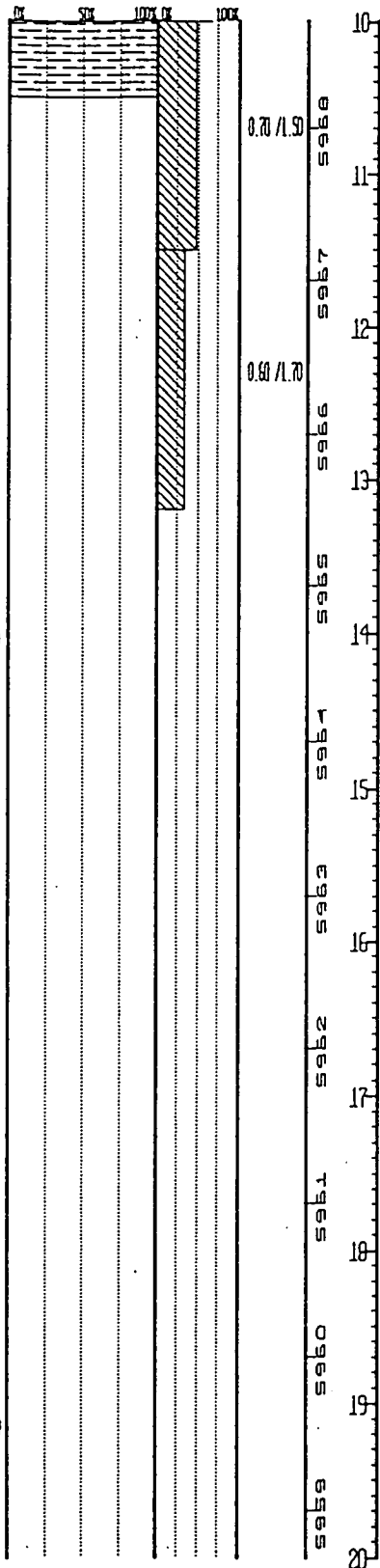
STATE PLANE COORDINATE: TOTAL DEPTH (FT): 13.20 GROUND ELEVATION (FT): 5978.70 PROJECT NUMBER: WWP LOG OF BORING NUMBER: 52194  
 NORTH: 749374 AREA: 90.1 YARD CASTING DIAMETER (IN): GEOLOGIST: K.R. MIYOSHI  
 EAST: 2084792 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.50 DATE DRILLED: 07/01/94  
 REMARKS: GEOTECHNICAL BOREHOLES ONLY, HOLLOWSTEM AUGER, ABANDONEQ, K.R. MIYOSHI/A.G. WOLCINSKI



STATE PLANE COORDINATE: TOTAL DEPTH (FT): 13.20 GROUND ELEVATION (FT): 5978.70 PROJECT NUMBER: WRP LOG OF BORING NUMBER: 52194  
 NORTH: 749374 AREA: 90.1 YARD CASING DIAMETER (IN): GEOLGIST: K.R. MIYOSHI  
 EAST: 2084792 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.50 DATE DRILLED: 07/01/94  
 REMARKS: GEOTECHNICAL BOREHOLES ONLY, HOLLOWSTEM AUGER, ABANDONED, K.R. MIYOSHI/A.G. WILCINSKI

DIAMETER BOREHOLE DEPTH  
 GRADATIONAL SAMPLE DEPTH  
 SAMPLE NUMBER

SAMPLE GRAIN SIZE PERCENT RECOVERY RECOVERY INTERVAL DATUM (FT) DEPTH (FT) WELL OR PIEZOMETER CONSTRUCTION LITHOLOGY UNSATURATED SOILS CLASSIFICATION OR ROCK TYPE DESCRIPTION

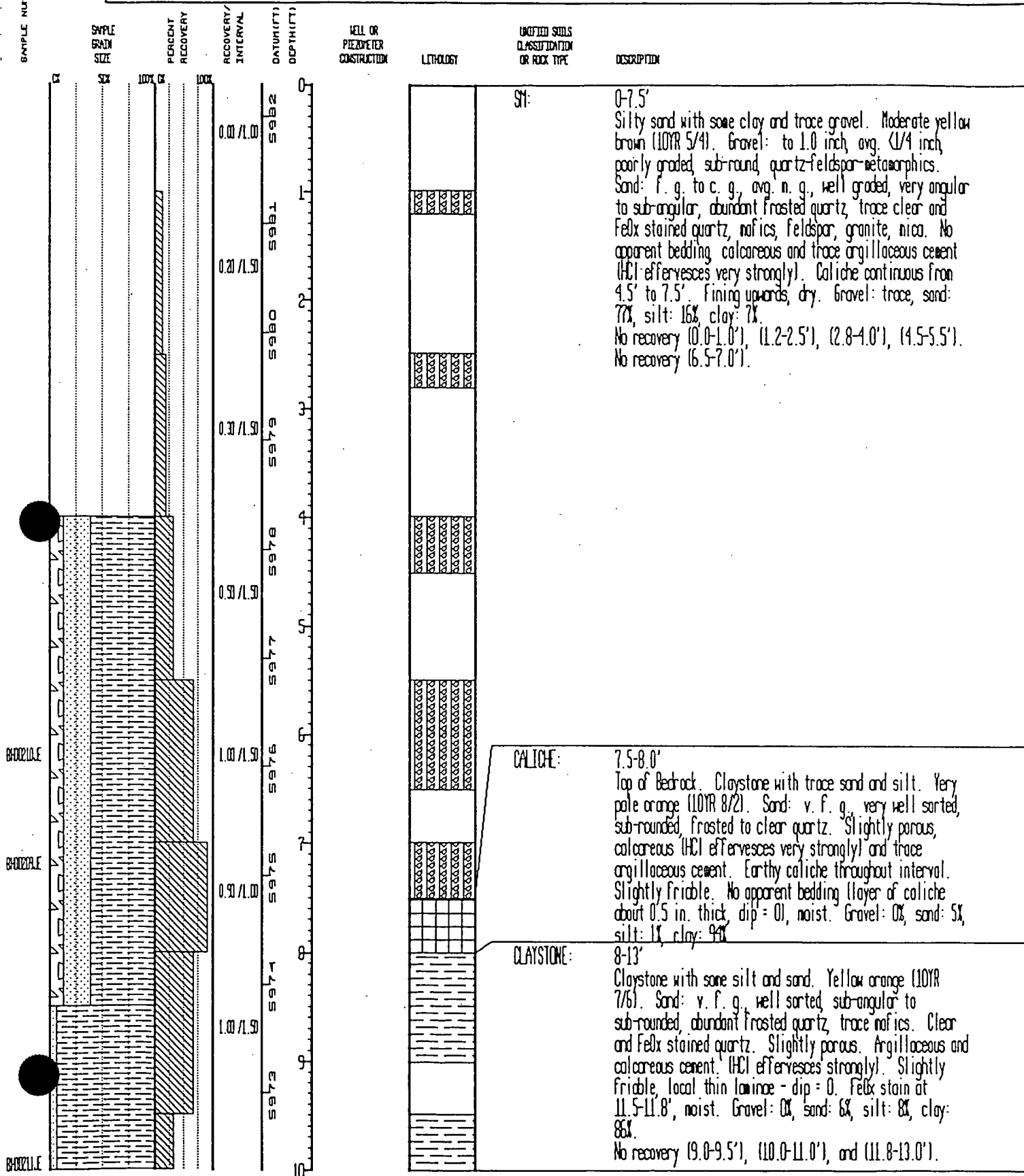


Total Depth Drilled: 13.20

LOG OF BORING NUMBER:

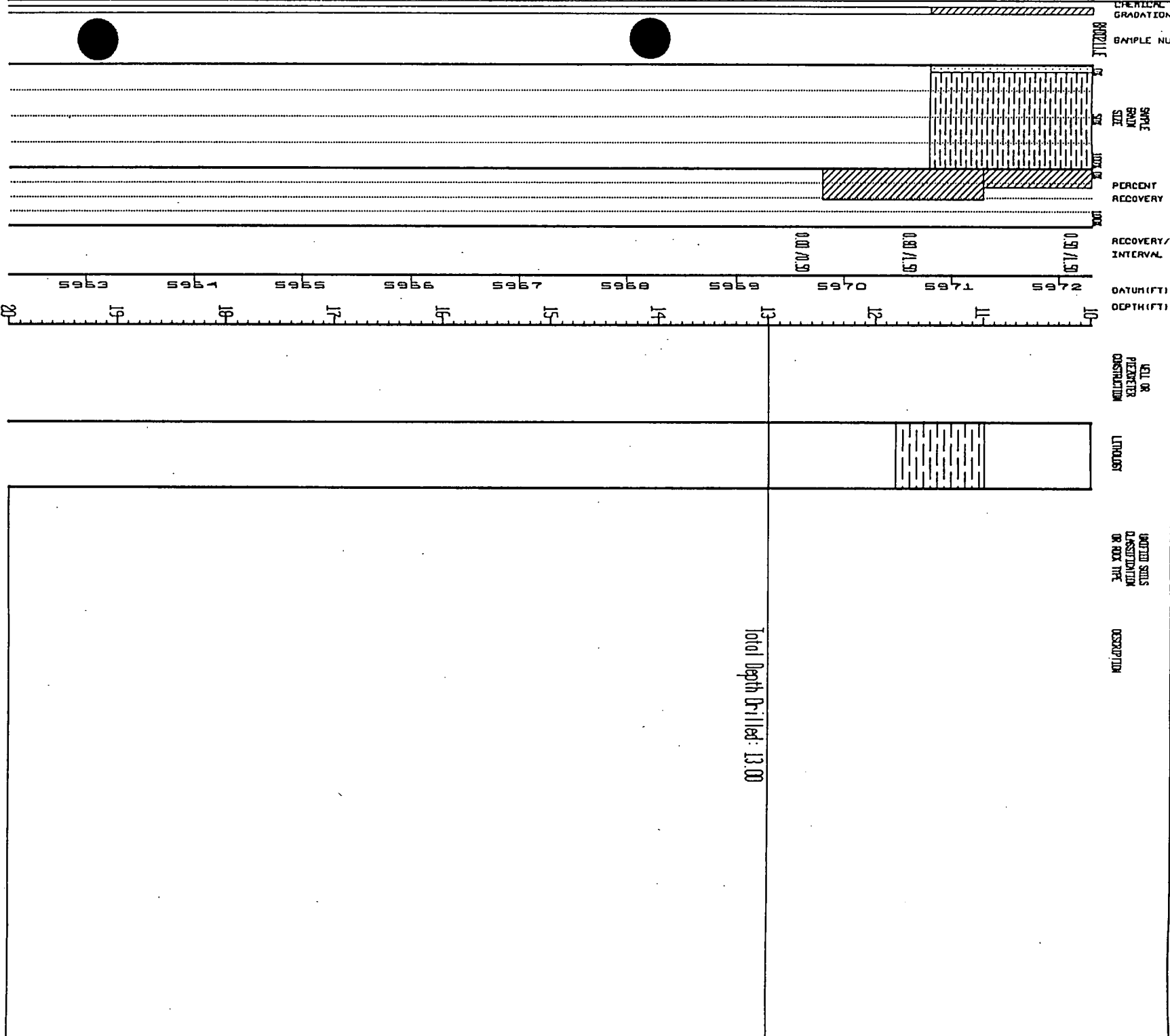
52294

REMARKS: GEOTECHNICAL BORCHLES ONLY. HOLLOWSTEM AUGER. ABANDONED. K.R. MIYOSHI/A.G. WILCINSKI





STATE PLANE COORDINATE: TOTAL DEPTH (FT): 13.00 GROUND ELEVATION (FT): 5992.30 PROJECT NUMBER: WPP  
 NORTH: 79908 AREA: 901 YRD CASING DIAMETER (IN): GEOLIST: K.R. MORTSHAW LOG OF BORING NUMBER:  
 EAST: 284934 LOCATION NUMBER: 0 BOREHOLE DIAMETER (IN): 6.50 DATE DRILLED: 06/30/94 52294  
 REMARKS: GEOTECHNICAL BORINGS ONLY, HULLSOUTH AFB, ARMOURED K.R. MORTSHAW, G. HILGERS



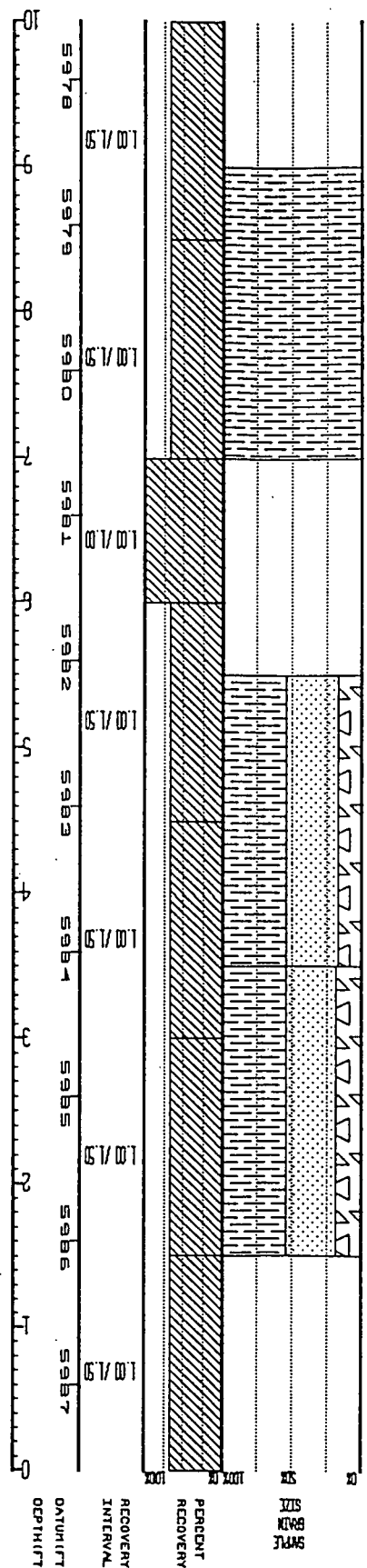
THE MINE SHAPED DEPTH  
GRADATIONAL SAMPLE DEPTH  
SAMPLE NUMBER

BOREHOLE

BOREHOLE

BOREHOLE

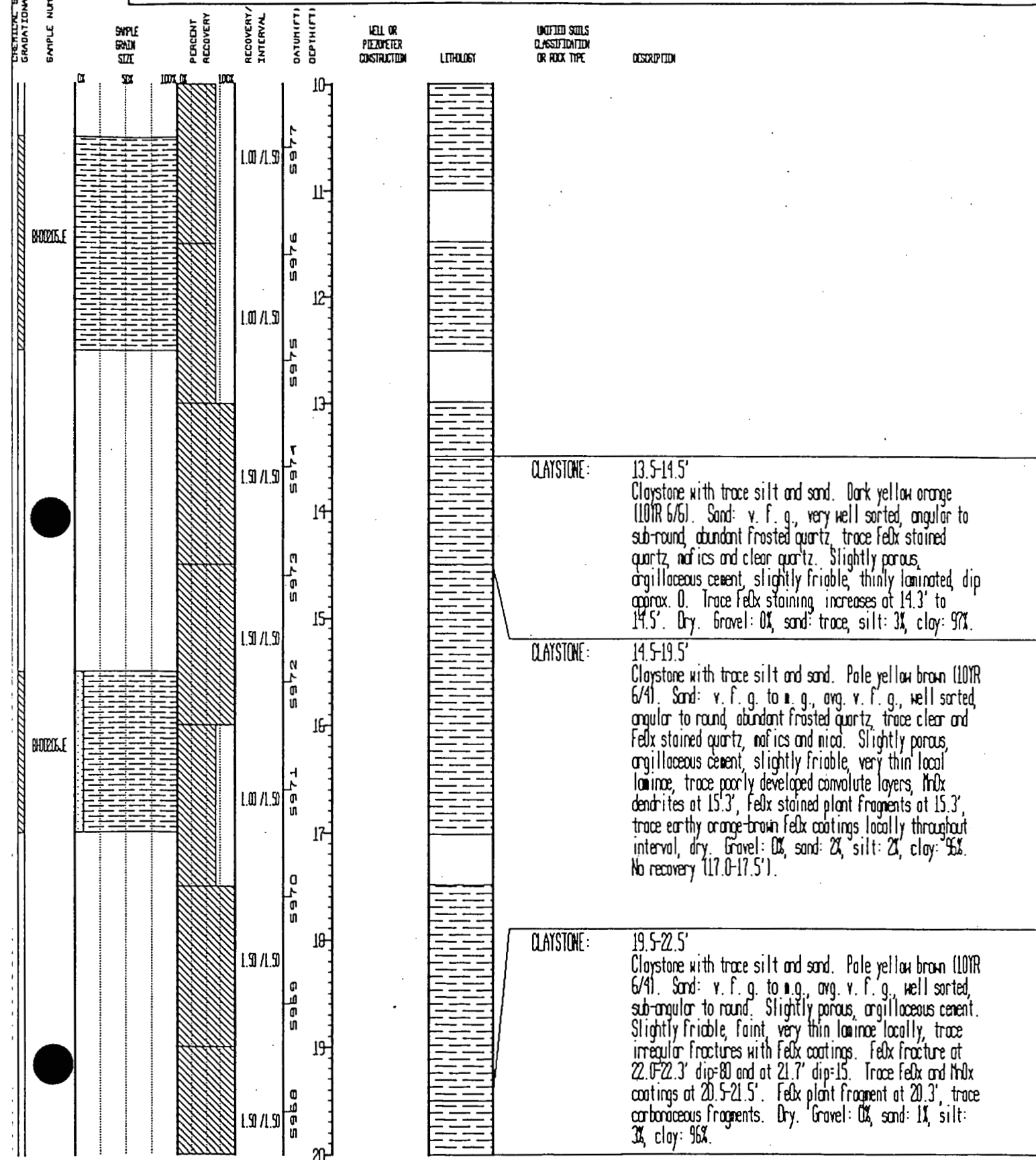
BOREHOLE



STATE PLANE COORDINATE: NORTH: 746370 EAST: 2084769  
TOTAL DEPTH (FT): 30.00 AREA: 301 YARD  
LOCATION NUMBER: 0 BOREHOLE DIAMETER (IN): 6.50  
GROUND ELEVATION (FT): 5597.60 BOREHOLE DIAMETER (IN): 6.50  
PROJECT NUMBER: WAP GEOLOGIST: K.R. MITCHELL DATE DRILLED: 06/29/94  
LOG OF BOREHOLE NUMBER: 52394

REMARKS: GEOTECHNICAL BOREHOLES ONLY, HOLLOWATER ALBER, AARWONQ, K.R. MITCHELL/A.G. WILKINSKI

STATE PLANE COORDINATE: TOTAL DEPTH (FT): 30.00 GROUND ELEVATION (FT): 5987.60 PROJECT NUMBER: WAPP LOG OF BORING NUMBER: 52394  
 NORTH: 748670 AREA: 901 YARD CASING DIAMETER (IN): GEOLGIST: K.R. MIYOSHI  
 EAST: 2084769 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.50 DATE DRILLED: 06/29/94  
 REMARKS: GEOTECHNICAL BOREHOLES ONLY, HOLLOWSTEM AUGER, ABANDONED, K.R. MIYOSHI/A.G. WILCINSKI



## STATE PLANE COORDINATE:

NORTH: 743670

EAST: 2084769

REMARKS: GEOTECHNICAL BOREHOLES ONLY, HOLLOWATER ALLEY, ABBOTSDALE, K.R. MOTOSH/A.G. KULONOSKI

TOTAL DEPTH (FT): 30.00

AREA: 901 YARD

LOCATOR NUMBER: 0

GROUND ELEVATION (FT): 5997.60

CASING DIAMETER (IN):

BOREHOLE DIAMETER (IN): 6.50

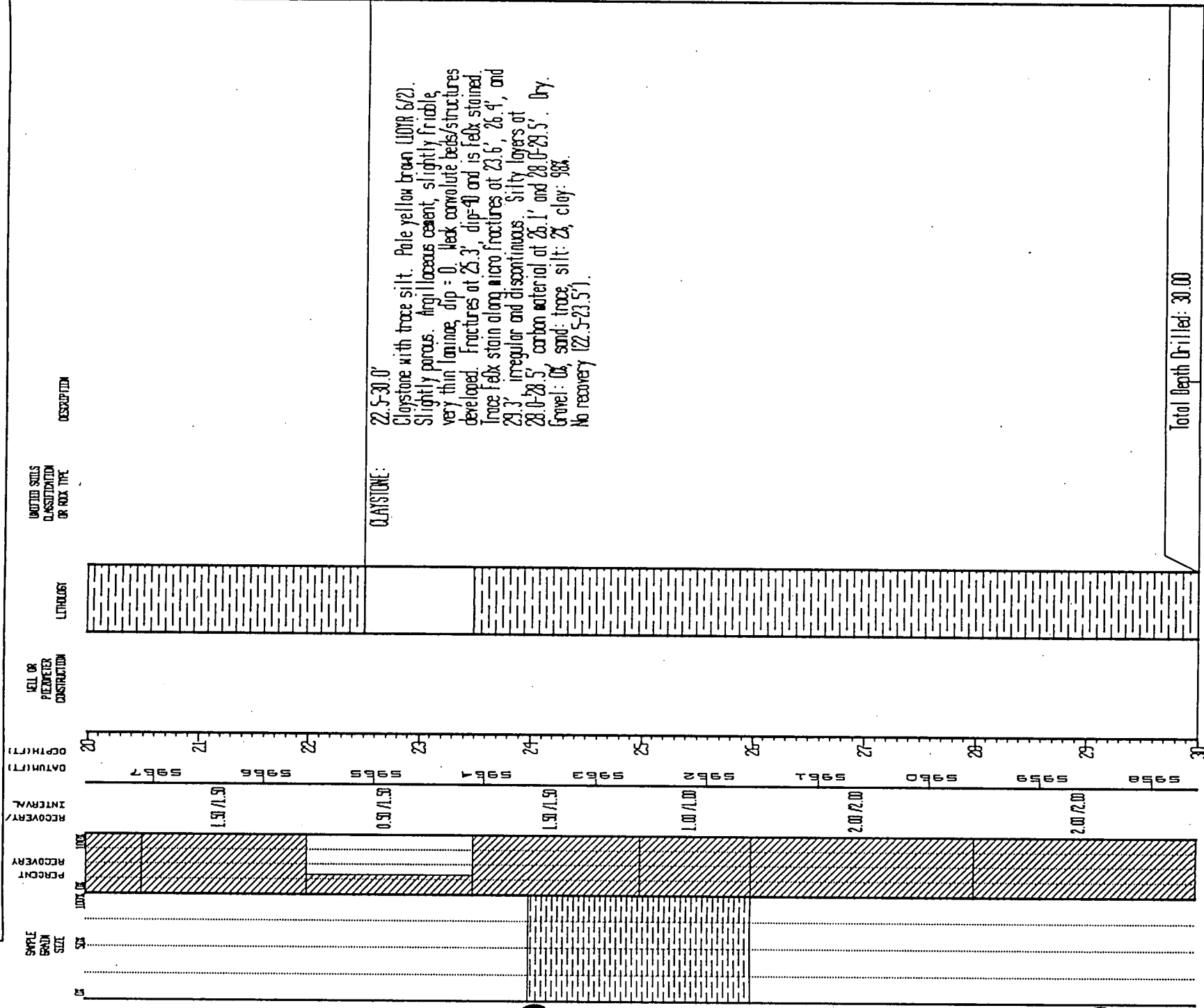
PROJECT NUMBER: WAPP

GEOLOGIST: K.R. MOTOSH

DATE DRILLED: 06/29/94

LOG OF BOREHOLE NUMBER:

52394

CREATED: 08/11/94  
GRADATIONAL BOREHOLE DEPTH  
SAMPLE NUMBER

Total Depth Drilled: 30.00

REMARKS: HSA TO 20 FEET. AIR ROTARY TO TD, J.C. WRIGHT, SEP

LOCATOR NUMBER: 0

BORE-HOLE DIAMETER (IN): 6.00

DATE ORILED: 09/16/94

LOG OF BOARDING NUMBER:

69194

REMARKS: 15A TO 20 FEET. AER ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOFHOLE, ABANDONED 9/22/94. LOG FROM CUTTINGS ONL.

[illegible]

STATE PLANE COORDINATE: TOTAL DEPTH (FT): 185.00 GROUND ELEVATION (FT): 5956.30 PROJECT NUMBER: WAPP LOG OF BORING NUMBER: 69194  
 NORTH: 754134 AREA: NORTH BUFFER ZONE CASING DIAMETER (IN): 6.00 GEOLOGIST: J.C. WRIGHT  
 EAST: 2084631 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 09/16/94  
 REMARKS: HSA TO 20 FEET. AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/22/94. LOG FROM CUTTINGS ONLY

WELL OR  
PIEZOMETER  
CONSTRUCTION

LITHOLOGY

UNITED STATES  
CLASSIFICATION  
OR ROCK TYPE

DESCRIPTION

DEPTH (FT)

RECOVERY/INTERVAL

PERCENT RECOVERY

SAMPLE GRAIN SIZE

100% OR

50%

100%

10

11

12

13

14

15

16

17

18

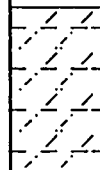
19

20



GM: 10-13'  
 Gravely sand with some silt and clay. Mod. yellow brown (10YR 5/4). Sand is n.g. to f.g. Gravel is mod. rounded to rounded. Moist, cohesive.  
 No recovery (10.5-13').

CLAYEY SILTSTONE: Top of Bedrock at 13 ft.  
 14.5-15.5'  
 Clayey siltstone with some f.g. sand. Dark yellow orange (10YR 6/6). Non-friable, moist, non-calcareous.  
 No recovery (13-14.5'), (15.5-20').



STATE PLANE COORDINATE: TOTAL DEPTH (FT): 185.00 GROUND ELEVATION (FT): 5956.30 PROJECT NUMBER: WAP LOG OF BORING NUMBER:  
 NORTH: 754134 AREA: NORTH BUFFER ZONE CASING DIAMETER (IN): 6.00 GEOLOGIST: J.C. WRIGHT  
 EAST: 2084631 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 09/16/94  
 REMARKS: HSA TO 20 FEET. AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/22/94. LOG FROM CUTTINGS ONLY

69194

SAMPLE GRAIN SIZE PERCENT RECOVERY RECOVERY INTERVAL DATUM (FT) DEPTH (FT) WELL OR PIEZOMETER CONSTRUCTION LITHOLOGY UNIFIED SOILS CLASSIFICATION OR ROCK TYPE DESCRIPTION

OK	50	100	OK	100	OK	20
						5956
						21
						5955
						22
						5954
						23
						5953
						24
						5952
						25
						5951
						26
						5950
						27
						5949
						28
						5948
						29
						5947
						30

CLAYSTONE:

20-50'

Claystone. Grayish orange to dark yellow brown (10YR 7/4 to 10YR 6/6). In weathered zone, dark gray (N3) below weathered zone. Cohesive, non-friable, waxy. Argillaceous cement. Moist to bottom of weathered zone (30 feet). Carbon content increases 45-50 feet.

STATE PLANE COORDINATE: TOTAL DEPTH (FT): 185.00 GROUND ELEVATION (FT): 5556.30 PROJECT NUMBER: WAPP LOG OF BORING NUMBER: 69194  
 NORTH: 754134 AREA: NORTH BUFFER ZONE CASING DIAMETER (IN): 6.00 GEOLOGIST: J.C. WRIGHT  
 EAST: 2084631 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 09/16/94  
 REMARKS: HSA TO 20 FEET. AIR ROTARY TO TD, J.C. WRIGHT, SEP. SPEC. BOREHOLE, ABANDONED 9/22/94. LOG FROM CUTTINGS ONLY

WELL OR  
PIEZOMETER  
CONSTRUCTION

LITHOLOGY

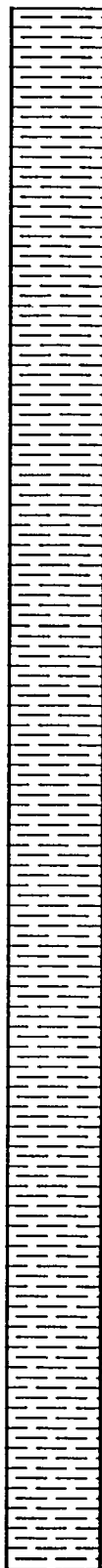
UNDISTURBED SOILS  
CLASSIFICATION  
OR ROCK TYPE

DESCRIPTION

DEPTH (FT)

5917 5918 5919 5920 5921 5922 5923 5924 5925 5926 5927

30 31 32 33 34 35 36 37 38 39 40





69194

SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/ INTERVAL	DATE (FT) DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNITED STATES CLASSIFICATION OR ROCK TYPE	DESCRIPTION
5/8	100	100	5916				
1/2	100	100	5915				
3/8	100	100	5914				
1/4	100	100	5913				
3/16	100	100	5912				
1/8	100	100	5911				
5/16	100	100	5910				
3/8	100	100	5909				
1/2	100	100	5908				
3/4	100	100	5907				

LOG OF BORING NUMBER:

J C WRIGHT

DATE ORDL'D: 09/16/94

69194

DESCRIPTION

SILTY CLAYSTONE: 50-60'  
Silty claystone. Dark gray (N3). Argillaceous cement,  
slightly friable, dry.

69194

SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/ INTERVAL	DATE (FT) DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNITED STATES CLASSIFICATION OR ROCK TYPE	DESCRIPTION
50	100	100	60			SILTSTONE:	60-65' Siltstone. Med gray (N5). Argillaceous cement, mod. friable. Dry. Thin bed of carbonaceous material noted during drilling at about 62.5-63.2'.
			61				
			62				
			63				
			64				
			65			SILTY CLAYSTONE: 65-70'	Silty claystone. Med. gray (N5). Argillaceous cement, weakly friable, dry.
			66				
			67				
			68				
			69				
			70				

69194

DEPOSITION GRADATION	SAMPLE NO.	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY INTERVAL	DATE (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNITED STATES CLASSIFICATION OR ROCK TYPE	DESCRIPTION
						70				SILTY CLAYSTONE: 70-75'
						70.5				Silty claystone with thin (5 ft) interbed of hard siltstone. Med. gray (NS). Argillaceous cement, weakly friable, dry. Weakly to moderately calcareous.
						71				
						71.5				
						72				
						72.5				
						73				
						73.5				
						74				
						74.5				
						75				SILTY CLAYSTONE: 75-80'
						75.5				Silty claystone. Med. gray (NS). Argillaceous cement, very weakly friable, dry.
						76				
						76.5				
						77				
						77.5				
						78				
						78.5				
						79				
						79.5				
						80				

# STATE PLANE COORDINATE:

NORTH: 754034

EAST: 2084631

REMARKS: HSA TO 20 FEET. AIR ROUTE TO TQ, J.C. WRIGHT, SEP

TOTAL DEPTH (FT): 105.00

AREA: NORTH BUFFER ZONE

LOCATOR NUMBER: 0

GROUND ELEVATION (FT): 5556.30

CASING DIAMETER (IN): 6.00

BOREHOLE DIAMETER (IN): 6.00

SPEC. BOREHOLE, ABANDONED 9/22/94. LOG FROM CUTTINGS ON

PROJECT NUMBER:

GEOLOGIST: J.C. WRIGHT

DATE DRILLED: 09/16/94

LOG OF BOREHOLE NUMBER:

69194

SAMPLE  
BRAIN  
SIZE

PERCENT  
RECOVERY

RECOVERY  
INTERVAL

DATE (FT)

WELL OR  
PIEZOMETER  
CONSTRUCTION

LITHOLOGY

UNITED STATES  
CLASSIFICATION  
OR ROCK TYPE

DESCRIPTION

0

15

30

45

60

75

90

105

5067 5068 5069 5070 5071 5072 5073 5074 5075 5076

5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100



CLAYSTONE: 80-90'

Claystone. Dark gray (N3). Argillaceous cement, nonfriable, waxy. Slightly moist.

STATE PLANE COORDINATE: TOTAL DEPTH (FT): 185.00 GROUND ELEVATION (FT): 5956.30 PROJECT NUMBER: WAP LOG OF BORING NUMBER: 69194  
 NORTH: 754134 AREA: NORTH BUFFER ZONE CASING DIAMETER (IN): 6.00 GEOLOGIST: J.C. WRIGHT  
 EAST: 2084631 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 09/16/94  
 REMARKS: HSA TO 20 FEET. AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/22/94. LOG FROM CUTTINGS ONLY.

DEPT (FT) DEPTH (FT) WELL OR PIEZOMETER CONSTRUCTION LITHOLOGY UNITED SOILS CLASSIFICATION OR ROCK TYPE DESCRIPTION

DEPT (FT) DEPTH (FT) WELL OR PIEZOMETER CONSTRUCTION LITHOLOGY UNITED SOILS CLASSIFICATION OR ROCK TYPE DESCRIPTION

90-95' Coal and interbedded claystone. Coal is grayish black to black (N2 to N1). Claystone is dark grey (N3). Coal has metallic luster and conchoidal fracture. Claystone has argillaceous cement, is nonfriable and waxy. Dry.

95-115' Claystone. Dark gray (N3). Argillaceous cement, nonfriable, waxy. Dry.

STATE PLANE COORDINATE: TOTAL DEPTH (FT): 185.00 GROUND ELEVATION (FT): 5556.30 PROJECT NUMBER: WAP LOG OF BORING NUMBER:  
 NORTH: 754134 AREA: NORTH BUFFER ZONE CASING DIAMETER (IN): 6.00 GEOLOGIST: J.C. WRIGHT  
 EAST: 2084631 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 09/16/94  
 REMARKS: HSA TO 20 FEET. AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/22/94. LOG FROM CUTTINGS ONL

69194

DEPTH (FT)	DATE (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNITED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
100	100				
101	101				
102	102				
103	103				
104	104				
105	105				
106	106				
107	107				
108	108				
109	109				
110	110				

STATE PLANE COORDINATE: TOTAL DEPTH (FT): 185.00 GROUND ELEVATION (FT): 5956.30 PROJECT NUMBER: WHP. LOG OF BORDING NUMBER: 69194  
 NORTH: 754134 AREA: NORTH BUFFER ZONE CASING DIAMETER (IN): 6.00 GEOLOGIST: J.C. WRIGHT  
 EAST: 2084631 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 09/16/94  
 REMARKS: HSA TO 20 FEET. AIR ROTARY TO TQ, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/22/94. LOG FROM CUTTINGS ONLY

WELL OR  
PIEZOMETER  
CONSTRUCTION

LITHOLOGY

UNITED STATES  
CLASSIFICATION  
OR ROCK TYPE

DESCRIPTION

SAMPLE  
GRAIN  
SIZE

PERCENT  
RECOVERY

RECOVERY/  
INTERVAL

DATUM (FT)  
DEPTH (FT)

WELL OR  
PIEZOMETER  
CONSTRUCTION

LITHOLOGY

UNITED STATES  
CLASSIFICATION  
OR ROCK TYPE

DESCRIPTION

5X

100X OR

100X

110

5816

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SILTY CLAYSTONE: 115-155'

Silty claystone. Med. to dark gray (N4 to N3).  
 Argillaceous cement, weakly friable, dry. Increased silt  
 content and friability from 130 to 140 Feet and 150 to 160  
 feet.



STATE PLANE COORDINATE: TOTAL DEPTH (FT): 185.00 GROUND ELEVATION (FT): 5956.30 PROJECT NUMBER: WAPP LOG OF BORING NUMBER: 69194  
 NORTH: 754134 AREA: NORTH BUFFER ZONE CASING DIAMETER (IN): 6.00 GEOLOGIST: J.C. WRIGHT  
 EAST: 2084631 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 09/16/94  
 REMARKS: HSA TO 20 FEET. AIR ROTARY TO TO, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/22/94. LOG FROM CUTTINGS ONL

DEPTH (FT)	DATE (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNITED STATES CLASSIFICATION OR ROCK TYPE	DESCRIPTION
120	5836				
121	5835				
122	5834				
123	5833				
124	5832				
125	5831				
126	5830				
127	5829				
128	5828				
129	5827				
130					

STATE PLANE COORDINATE: TOTAL DEPTH (FT): 185.00 GROUND ELEVATION (FT): 5956.30 PROJECT NUMBER: WWP LOG OF BORING NUMBER:  
 NORTH: 754134 AREA: NORTH BUFFER ZONE CASING DIAMETER (IN): 6.00 GEOLOGIST: J.C. WRIGHT  
 EAST: 2084631 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 09/16/94  
 REMARKS: HSA TO 20 FEET. AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/22/94. LOG FROM CUTTINGS ONLY

69194

DEPTH (FT)	DATE (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNITED STATES CLASSIFICATION OR ROCK TYPE	DESCRIPTION
130	5826				
131	5825				
132	5824				
133	5823				
134	5822				
135	5821				
136	5820				
137	5819				
138	5818				
139	5817				
140					

STATE PLANE COORDINATE: TOTAL DEPTH (FT): 185.00 GROUND ELEVATION (FT): 5956.30 PROJECT NUMBER: WAPP LOG OF BORING NUMBER:  
 NORTH: 754134 AREA: NORTH BUFFER ZONE CASING DIAMETER (IN): 6.00 GEOLOGIST: J.C. WRIGHT  
 EAST: 2084631 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 09/16/94  
 REMARKS: HSA TO 20 FEET. ADR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/22/94. LOG FROM CUTTINGS ON

69194

DEPTH (FT)	DATE (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNITED STATES CLASSIFICATION OR ROCK TYPE	DESCRIPTION
140	se16				
141	se15				
142	se14				
143	se13				
144	se12				
145	se11				
146	se10				
147	se9				
148	se8				
149	se7				
150					

DEPT. OF AGRICULTURE  
 NATIONAL BUREAU OF SOILS  
 WASHINGTON, D.C. 20250

# STATE PLANE COORDINATE:

NORTH: 754134  
EAST: 2084631

REMARKS: HSA TO 20 FEET. AIR ROUTE TO TR. J.C. WRIGHT, SEP. SEC. 08E04E, 88W00N09 922294. LOG FROM OUTRIGGS ON.

TOTAL DEPTH (FT): 185.00

AREA: NORTH BUFFER ZONE

LOCATOR NUMBER: 0

GROUND ELEVATION (FT): 5556.30

CASING DIAMETER (IN): 6.00

BOREHOLE DIAMETER (IN): 6.00

PROJECT NUMBER: WAPP

GEOLGIST: J.C. WRIGHT

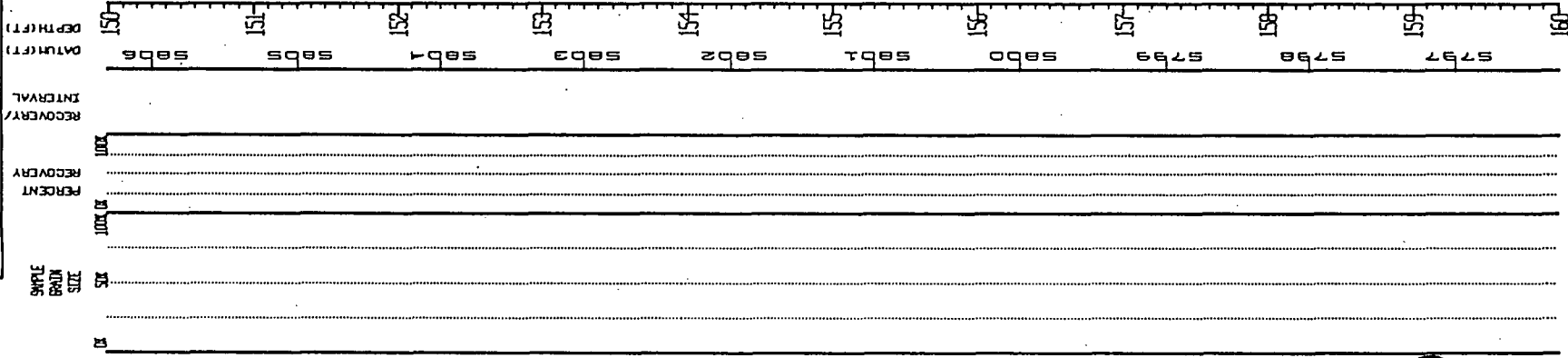
DATE DRILLED: 09/16/94

LOG OF BERING NUMBER:

69194

BMPLE NUMBER

GRADATIONAL BMPLE DEPTH



CELL OR  
PIEZOMETER  
CONSTRUCTION

UNITED STATES  
CLASSIFICATION  
OR ROCK TYPE

DESCRIPTION



STATE PLANE COORDINATE: TOTAL DEPTH (FT): 185.00 GROUND ELEVATION (FT): 5956.30 PROJECT NUMBER: WARP LOG OF BOREHOLE NUMBER: 69194  
 NORTH: 754134 AREA: NORTH BUFFER ZONE CASING DIAMETER (IN): 6.00 GEOLOGIST: J.C. WRIGHT  
 EAST: 2084631 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 09/16/94  
 REMARKS: HSA TO 20 FEET. AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/22/94. LOG FROM CUTTINGS ONL

VERTICAL SAMPLE DEPTH  
 GRADATIONAL SAMPLE DEPTH  
 SAMPLE NAME  
 SAMPLE GRAIN SIZE  
 PERCENT RECOVERY  
 RECOVERY/INTERVAL  
 DATUM (FT)  
 DEPTH (FT)  
 WELL OR PIEZOMETER CONSTRUCTION  
 LITHOLOGY  
 UNOBTAINED SOILS CLASSIFICATION OR ROCK TYPE  
 DESCRIPTION

160  
 5796  
 161  
 5795  
 162  
 5794  
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 5791  
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 167  
 5789  
 168  
 5788  
 169  
 5787  
 170

SILTY CLAYSTONE: 160-185'  
 Silty claystone. Med. dark gray to dark gray (M4 to M3).  
 Argillaceous cement. Weakly friable, dry.



STATE PLANE COORDINATE: TOTAL DEPTH (FT): 185.00 GROUND ELEVATION (FT): 5956.30 PROJECT NUMBER: WAPP LOG OF BORING NUMBER:  
 NORTH: 754134 AREA: NORTH BUFFER ZONE CASING DIAMETER (IN): 6.00 GEOLOGIST: J.C. WRIGHT 69194  
 EAST: 2084631 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 09/16/94  
 REMARKS: HSA TO 20 FEET. AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/22/94. LOG FROM CUTTINGS ONLY

WELL OR  
PIEZOMETER  
CONSTRUCTION

LITHOLOGY

UNIFIED SOILS  
CLASSIFICATION  
OR ROCK TYPE

DESCRIPTION

SAMPLE  
GRAIN  
SIZE

PERCENT  
RECOVERY

RECOVERY/  
INTERVAL

DATE (FT)  
DEPTH (FT)

180  
5776  
181  
5775  
182  
5774  
183  
5773  
184  
5772  
185  
5771  
186  
5770  
187  
5769  
188  
5768  
189  
5767  
190

180  
181  
182  
183  
184  
185  
186  
187  
188  
189  
190

Total Depth Drilled: 185.00

69294

SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/ INTERVAL	DATE (FT) DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
50	100	100	5943				ML: 4.5-5.5' Clayey sandy silt with trace fine grained gravel. Very pale orange (10YR 8/2). Strongly calcareous - a caliche horizon. Dry. No recovery (0-4.5'), (5.5-10').
			5944				
			5945				
			5946				
			5947				
			5948				
			5949				
			5950				
			5951				
			5952				



EAST: 2084878

AREA: NORTH BUFFER ZONE

LOCATOR NUMBER: 0

GROUND ELEVATION (FT): 5952.70

CASING DIAMETER (IN): 6.00

BOREHOLE DIAMETER (IN): 6.00

PROJECT NUMBER: WHOP

GEOLOGIST: J. C. WRIGHT

DATE DRILLED: 09/16/94

LOG OF BORDING NUMBER:

69294

REMARKS: 15A TO 20 FEET, AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/30/94. LOG FROM CUTTINGS ONLY


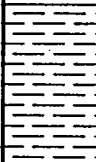
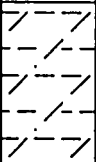
SAMPLE BRAND SIZE	PERCENT RECOVERY	RECOVERY/ INTERVAL	DATUM(FT)	DEPTH(FT)
5/8	100		5912	10
			5911	11
			5910	12
			5909	13
			5908	14
			5907	15
			5906	16
			5905	17
			5904	18
			5903	19
			5902	20

WELL OR  
PIEZOMETER  
CONSTRUCTION

## LITHOLOGY

UNIFIED SOILS  
CLASSIFICATION  
OR ROCK TYPE

**DESCRIPTION:**

	<p>SW: 10-12'          Gravelly sand with some silt and clay. Mod. brown (5YR 4/4). Sand ranges from c.g. to f.g. Cohesive, moist.          No recovery (10.5-12').</p>
	<p>CLAYSTONE: Top of Bedrock at 12'.          14.5-15.5'          Claystone - oxidized. Mod. yellow brown (10YR 5/4). Weakly calcareous. Moist.          No recovery (12-14.5'), (15.5-16').</p>
	<p>SILTY CLAYSTONE: 18.5-19.5'          Silty claystone. Pale yellow brown to dark yellow brown (10YR 6/2 to 10YR 4/2). Mod. calcareous, moist.          No recovery (16-18.5'), (19.5-20').</p>

STATE PLANE COORDINATE:

NORTH: 754052

EAST: 2084878

TOTAL DEPTH (FT): 240.00

AREA: NORTH BUFFER ZONE

LOCATOR NUMBER: 0

GROUND ELEVATION (FT): 5952.70

CASING DIAMETER (IN): 6.00

BOREHOLE DIAMETER (IN): 6.00

PROJECT NUMBER:

WARP

GEOLOGIST:

J.C. WRIGHT

DATE DRILLED:

09/16/94

LOG OF BOREHOLE NUMBER:

69294

REMARKS: HSA TO 20 FEET, AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/30/94. LOG FROM CUTTINGS ONLY

SAMPLE  
GRAIN  
SIZEPERCENT  
RECOVERYRECOVERY/  
INTERVALDATE (FT)  
DEPTH (FT)WELL OR  
PIEZOMETER  
CONSTRUCTION

LITHOLOGY

UNIFIED SOILS  
CLASSIFICATION  
OR ROCK TYPE

DESCRIPTION

SILTY CLAYSTONE: 20-30'

Silty claystone. Pale yellow brown to mod. yellow brown  
(10YR 6/2 to 10YR 4/2). Oxidized, argillaceous cement,  
slightly friable, moist.

69294

SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/ INTERVAL	DATE(TIME) DEPTH(T)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNITED STATES CLASSIFICATION OR ROCK TYPE	DESCRIPTION
50	100	100	30				
			31				
			32				
			33				
			34				
			35				
			36				
			37				
			38				
			39				
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			96				
			97				
			98				
			99				
			100				

LOG OF BOARDING NUMBER:

J.C. WRIGHT

09/16/94

69294

**DESCRIPTION**

Re

Silty claystone to clayey siltstone. Med. gray to med. dark gray (N5 to N4). Argillaceous cement, slightly friable, moist. Thin layer of coal between 50-55' and increasing carbonaceous content.

STATE PLANE COORDINATE: TOTAL DEPTH (FT): 240.00 GROUND ELEVATION (FT): 5552.70 PROJECT NUMBER: WAPP LOG OF BORING NUMBER: 69294  
 NORTH: 754052 AREA: NORTH BUFFER ZONE CASING DIAMETER (IN): 6.00 GEOLOGIST: J.C. WRIGHT  
 EAST: 2084878 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 09/16/94  
 REMARKS: 15A TO 20 FEET, AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/30/94. LOG FROM CUTTINGS ONLY

SAMPLE GRAIN SIZE PERCENT RECOVERY/INTERVAL DATUM (FT) DEPTH (FT) WELL OR PIEZOMETER CONSTRUCTION LITHOLOGY UNIFIED SOILS CLASSIFICATION OR ROCK TYPE DESCRIPTION

12	52	100	100		50
					51
					52
					53
					54
					55
					56
					57
					58
					59
					60

09/29/94  




CLAYSTONE: 55-60'  
 Claystone. Dark gray (M3). Argillaceous cement, nonfriable, waxy, slightly moist.

69294

WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
			SILTY CLAYSTONE: 60-75' Silty claystone. Med. gray to med. dark gray. Argillaceous cement, weakly friable. Slightly moist.

STATE PLANE COORDINATE: TOTAL DEPTH (FT): 240.00 GROUND ELEVATION (FT): 5552.70 PROJECT NUMBER: WPP LOG OF BORING NUMBER:  
 NORTH: 754052 AREA: NORTH BUFFER ZONE CASING DIAMETER (IN): 6.00 GEOLOGIST: J.C. WRIGHT  
 EAST: 2084878 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 09/16/94  
 REMARKS: HSA TO 20 FEET, AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/30/94. LOG FROM CUTTINGS ONLY

69294

WELL OR  
PIEZOMETER  
CONSTRUCTION

LITHOLOGY

UNITED SOILS  
CLASSIFICATION  
OR ROCK TYPE

DESCRIPTION

DEPTH (FT)

70

69.5

69

68.5

68

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CLAYSTONE:

75-125'


Claystone. Dark gray to grayish black (M3-M2).  
 Argillaceous cement, nonfriable, waxy, slightly moist.  
 Note: silty interbeds at approx. 87, 93, and 98 feet.

LOG OF BORING NUMBER:

69294

DATE DRILLED: 09/16/94

REMARKS: HSA TO 20 FEET, AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/30/94. LOG FROM CUTTINGS ONLY

SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY INTERVAL	DATUM(FT) DEPTH(FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNITED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
50	100	100	5653				
			5654				
			5655				
			5656				
			5657				
			5658				
			5659				
			5670				
			5671				
			5672				
			80				
			81				
			82				
			83				
			84				
			85				
			86				
			87				
			88				
			89				
			90				



REMARKS: 15A TO 20 FEET, AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/30/94. LOG FROM CUTTINGS ONLY

LOCATOR NUMBER: 0

BORE-HOLE DIAMETER (IN): 6.00

DATE DRILLED: 09/16/94

LOG OF BORDING NUMBER:

69294

100% OK

1008

DATUM(FT)

## LITHOLOGY

**DESCRIPTION**

CHEMICAL SAMPLE DEPTH  
GRADATIONAL SAMPLE DEPTH  
SAMPLE NUMBER

STATE PLANE COORDINATE: TOTAL DEPTH (FT): 240.00 GROUND ELEVATION (FT): 5952.70 PROJECT NUMBER: WRP LOG OF BORING NUMBER:  
 NORTH: 754052 AREA: NORTH BUFFER ZONE CASING DIAMETER (IN): 6.00 GEOLOGIST: J.C. WRIGHT 69294  
 EAST: 2084878 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 09/16/94  
 REMARKS: HSA TO 20 FEET, AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/30/94. LOG FROM CUTTINGS ONLY

CHRONOLOGICAL DEPTH  
 GRADATIONAL SAMPLE DEPTH  
 SAMPLE NUMBER

SAMPLE  
GRAIN  
SIZE

PERCENT  
RECOVERY

RECOVERY/  
INTERVAL

DATUM (FT)  
DEPTH (FT)

WELL OR  
PIEZOMETER  
CONSTRUCTION

LITHOLOGY

UNITED STATES  
CLASSIFICATION  
OR ROCK TYPE

DESCRIPTION

CHRONOLOGICAL DEPTH	GRADATIONAL SAMPLE DEPTH	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)
0	0	50	100	100	5952	100
					5951	101
					5950	102
					5949	103
					5948	104
					5947	105
					5946	106
					5945	107
					5944	108
					5943	109
					5942	110



LOG OF STOPS NUMBER:

JC 19181

09/16/60

1

[illegible]

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STATE PLANE COORDINATE: TOTAL DEPTH (FT): 240.00 GROUND ELEVATION (FT): 5952.70 PROJECT NUMBER: WAPP LOG OF BORING NUMBER:  
 NORTH: 754052 AREA: NORTH BUFFER ZONE CASING DIAMETER (IN): 6.00 GEOLOGIST: J.C. WRIGHT  
 EAST: 2084878 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 09/16/94  
 REMARKS: HSA TO 20 FEET, AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/30/94. LOG FROM CUTTINGS ONLY

69294

VERTICAL BOREHOLE DEPTH  
 GRADATIONAL SAMPLE DEPTH  
 SAMPLE NUMBER

VERTICAL BOREHOLE DEPTH GRADATIONAL SAMPLE DEPTH SAMPLE NUMBER	DEPTH (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNITED STATES CLASSIFICATION OR ROCK TYPE	DESCRIPTION
120	120	120				
121	121	121				
122	122	122				
123	123	123				
124	124	124				
125	125	125				
126	126	126				
127	127	127				
128	128	128				
129	129	129				
130	130	130				

SILTY CLAYSTONE: 125-130'  
 Silty claystone. Med. gray to med. dark gray (N5-N4).  
 Argillaceous cement, weakly friable, slightly moist.

STATE PLANE COORDINATE: TOTAL DEPTH (FT): 240.00 GROUND ELEVATION (FT): 5952.70 PROJECT NUMBER: WRP LOG OF BORING NUMBER:  
 NORTH: 754052 AREA: NORTH BUFFER ZONE CASING DIAMETER (IN): 6.00 GEOLOGIST: J.C. WRIGHT 69294  
 EAST: 2084878 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 09/16/94  
 REMARKS: HSA TO 20 FEET, AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/30/94. LOG FROM CUTTINGS ONLY

DATE/DEPTH (FT) WELL OR PIEZOMETER CONSTRUCTION LITHOLOGY UNIFIED SOILS CLASSIFICATION OR ROCK TYPE DESCRIPTION

DATE/DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
130				
131				
132				
133				
134				
135				
136				
137				
138				
139				
140				

CLAYSTONE:

130-150'

Claystone. Same as 75-125'. Note: 140-145' wet. Possibly silty interbed between 140-141'.

STATE PLANE COORDINATE: TOTAL DEPTH (FT): 240.00 GROUND ELEVATION (FT): 5952.70 PROJECT NUMBER: WNP LOG OF BORING NUMBER:  
 NORTH: 754052 AREA: NORTH BUFFER ZONE CASING DIAMETER (IN): 6.00 GEOLOGIST: J.C. WRIGHT  
 EAST: 2084878 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 09/16/94  
 REMARKS: HSA TO 20 FEET, AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/30/94. LOG FROM CUTTINGS ONLY

69294

CHRONIC BOREHOLE DEPTH  
 GRADATIONAL BOREHOLE DEPTH  
 SAMPLE NUMBER

SAMPLE  
 GRAIN  
 SIZE

PERCENT  
 RECOVERY

RECOVERY/  
 INTERVAL

DATE (FT)  
 DEPTH (FT)

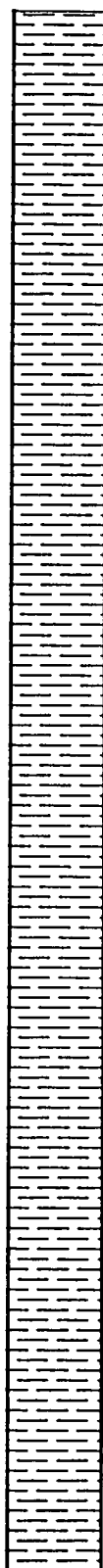
WELL OR  
 PIECEWISE  
 CONSTRUCTION

LITHOLOGY

UNITED STATES  
 CLASSIFICATION  
 OR ROCK TYPE

DESCRIPTION

0	0	0	0	140
1	1	1	1	141
2	2	2	2	142
3	3	3	3	143
4	4	4	4	144
5	5	5	5	145
6	6	6	6	146
7	7	7	7	147
8	8	8	8	148
9	9	9	9	149
10	10	10	10	150



STATE PLANE COORDINATE: NORTH: 754052 EAST: 2084678 TOTAL DEPTH (FT): 240.00 AREA: NORTH BUFFER ZONE LOCATOR NUMBER: 0 GROUND ELEVATION (FT): 5952.70 CASING DIAMETER (IN): 6.00 BOREHOLE DIAMETER (IN): 6.00 PROJECT NUMBER: WAPP GEOLOGIST: J.C. WRIGHT DATE DRILLED: 09/16/94 LOG OF BOREHOLE NUMBER: 69294

REMARKS: HSA TO 20 FEET, AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/30/94. LOG FROM CUTTINGS ONLY

CHANGING SAMPLE DEPTH  
GRADATIONAL SAMPLE DEPTH  
SAMPLE NUMBER

SAMPLE  
GRAIN  
SIZE  
PERCENT  
RECOVERY  
RECOVERY/  
INTERVAL

DATUM (FT)  
DEPTH (FT)

WELL OR  
PIEZOMETER  
CONSTRUCTION

LITHOLOGY

UNITED STATES  
CLASSIFICATION  
OR ROCK TYPE

DESCRIPTION

GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)
50	100	100	150	150
50	100	100	151	151
50	100	100	152	152
50	100	100	153	153
50	100	100	154	154
50	100	100	155	155
50	100	100	156	156
50	100	100	157	157
50	100	100	158	158
50	100	100	159	159
50	100	100	160	160

CLAYEY SILTSTONE: 150-155'

Clayey siltstone. Med. gray (N5). Argillaceous cement, mod. friable, moist.

CLAYSTONE: 155-165'

Claystone. Med. dark gray to dark gray (N4-N5). Argillaceous cement, nonfriable, waxy.

STATE PLANE COORDINATE: TOTAL DEPTH (FT): 240.00 GROUND ELEVATION (FT): 5952.70 PROJECT NUMBER: WAPP LOG OF BORING NUMBER: 69294  
 NORTH: 754052 AREA: NORTH BUFFER ZONE CASING DIAMETER (IN): 6.00 GEOLOGIST: J.C. WRIGHT  
 EAST: 2084678 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 09/16/94  
 REMARKS: HSA TO 20 FEET, AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/30/94. LOG FROM CUTTINGS ONLY

CREWING BOREHOLE DEPTH  
 GRADATIONAL BOREHOLE DEPTH  
 SAMPLE NUMBER

SAMPLE  
 GRAIN  
 SIZE  
 PERCENT  
 RECOVERY  
 RECOVERY/  
 INTERVAL

DATUM(FT)  
 DEPTH(FT)

WELL OR  
 PIEZOMETER  
 CONSTRUCTION

LITHOLOGY

UNIFIED SOILS  
 CLASSIFICATION  
 OR ROCK TYPE

DESCRIPTION

160
5752
161
5751
162
5750
163
5749
164
5748
165
5747
166
5746
167
5745
168
5744
169
5743
170



SILTY CLAYSTONE: 165-190'

Silty claystone. Med. gray to med. dark gray (M5-M4).  
 Argillaceous cement. Slightly friable, moist.



**SAMPLE NUMBER**

THE  
LIFE  
OF  
THE

PERCENT  
RECOVERRECOVERY/  
INTERVAL

WELL OF  
PIEZOMETER  
CONSTRUCTION

---

UNCLASSIFIED  
OR ROK TYPE

EAST:  
NORTH:

DATE: 4052 8-4878

LOCATOR NUMBER: 0  
AREA: NORTH BUFFER ZONE  
TOTAL DEPTH (FT): 240.00

GROUND ELEVATION (FT):  
CASING DIAMETER (IN):  
BOREHOLE DIAMETER (IN):

DATE  
07/03/00  
PROJ

09/15/60  
J.C. TIGHE  
AM

7676  
LOS ANGELES 90708 J 907

REMARKS: HSA TO 20 FEET, AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/30/94. LOG FROM CUTTINGS ONLY

66269

STATE PLANE COORDINATE:

NORTH: 754052

EAST: 2084878

TOTAL DEPTH (FT): 240.00

AREA: NORTH BUFFER ZONE

LOCATOR NUMBER: 0

GROUND ELEVATION (FT): 5952.70

CASING DIAMETER (IN): 6.00

BOREHOLE DIAMETER (IN): 6.00

PROJECT NUMBER: WAPP

GEOLOGIST: J.C. WRIGHT

DATE DRILLED: 09/16/94

LOG OF BORING NUMBER:

69294

REMARKS: 15A TO 20 FEET, AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/30/94. LOG FROM CUTTINGS ONLY

SAMPLE  
GRAIN  
SIZE

SM

PERCENT  
RECOVERY

100%

RECOVERY/  
INTERVAL

100%

DATE (FT)  
DEPTH (FT)

180

5772

181

5771

182

5770

183

5769

184

5768

185

5767

186

5766

187

5765

188

5764

189

5763

190

WELL OR  
PIEZOMETER  
CONSTRUCTION

LITHOLOGY

UNIFIED SOILS  
CLASSIFICATION  
OR ROCK TYPE

DESCRIPTION

STATE PLANE COORDINATE: TOTAL DEPTH (FT): 240.00 GROUND ELEVATION (FT): 5952.70 PROJECT NUMBER: WPP LOG OF BORING NUMBER: 69294  
 NORTH: 754052 AREA: NORTH BUFFER ZONE CASING DIAMETER (IN): 6.00 GEOLOGIST: J.C. WRIGHT  
 EAST: 2084878 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 09/16/94  
 REMARKS: HSA TO 20 FEET, AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/30/94. LOG FROM CUTTINGS ONLY

WELL OR  
PIEZOMETER  
CONSTRUCTION

UNIFIED SOILS  
CLASSIFICATION  
OR ROCK TYPE

LITHOLOGY

DESCRIPTION

DATE OF SAMPLE  
GRADATIONAL SAMPLE DEPTH  
SAMPLE NUMBER  
PERCENT RECOVERY  
RECOVERY INTERVAL  
DATE (FT)  
DEPTH (FT)

190  
191  
192  
193  
194  
195  
196  
197  
198  
199  
200

SILTY CLAYSTONE: 190-200'

Silty claystone. Med. dark gray (M4). Argillaceous cement, slightly friable, slightly moist.

STATE PLANE COORDINATE:

NORTH: 754052

EAST: 2084878

TOTAL DEPTH (FT): 240.00

AREA: NORTH BUFFER ZONE

LOCATOR NUMBER: 0

GROUND ELEVATION (FT): 5952.70

CASING DIAMETER (IN): 6.00

BOREHOLE DIAMETER (IN): 6.00

PROJECT NUMBER: WAPP

GEOLOGIST: J.C. WRIGHT

DATE DRILLED: 09/16/94

LOG OF BOREHOLE NUMBER:

69294

REMARKS: HSA TO 20 FEET, AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/30/94. LOG FROM CUTTINGS ONLY

CREATING BOREHOLE DEPTH  
GRADATIONAL BOREHOLE DEPTH  
SAMPLE NUMBERSAMPLE  
GRAIN  
SIZEPERCENT  
RECOVERYRECOVERY/  
INTERVALDATE/TIME  
DEPTH (FT)WELL OR  
PIEZOMETER  
CONSTRUCTION

LITHOLOGY

UNITED STATES  
CLASSIFICATION  
OR ROCK TYPE

DESCRIPTION

CLAYSTONE:

200-230'

Claystone. Med. dark gray to dark gray (N5-AN).  
Argillaceous cement. Nonfriable, waxy, slightly moist.

STATE PLANE COORDINATE: TOTAL DEPTH (FT): 240.00 GROUND ELEVATION (FT): 5952.70 PROJECT NUMBER: WAPP LOG OF BOREHOLE NUMBER: 69294  
 NORTH: 754052 AREA: NORTH BUFFER ZONE CASING DIAMETER (IN): 6.00 GEOLOGIST: J.C. WRIGHT  
 EAST: 2084678 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 09/16/94  
 REMARKS: HSA TO 20 FEET, AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/30/94. LOG FROM CUTTINGS ONLY

UNRECORDED SAMPLE DEPTH  
 GRADATIONAL SAMPLE DEPTH

SAMPLE NUMBER

SAMPLE  
GRAIN  
SIZE

PERCENT  
RECOVERY

RECOVERY/  
INTERVAL

DATUM (FT)  
DEPTH (FT)

WELL OR  
PIEZOMETER  
CONSTRUCTION

LITHOLOGY

UNIFIED SOILS  
CLASSIFICATION  
OR ROCK TYPE

DESCRIPTION

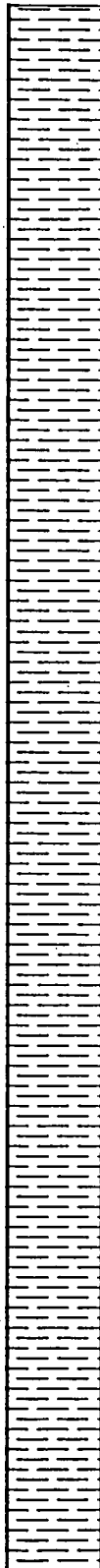
BT

50

100% OR

100%

210  
S742  
211  
S741  
212  
S740  
213  
S739  
214  
S738  
215  
S737  
216  
S736  
217  
S735  
218  
S734  
219  
S733  
220



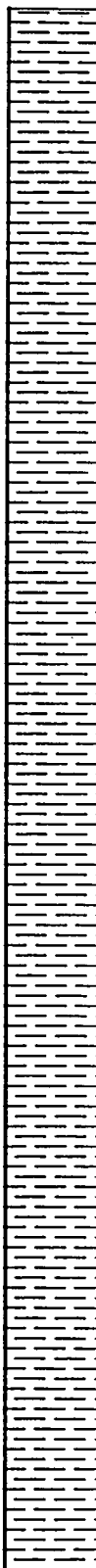
STATE PLANE COORDINATE: TOTAL DEPTH (FT): 240.00 GROUND ELEVATION (FT): 5952.70 PROJECT NUMBER: WHP LOG OF BORING NUMBER:  
 NORTH: 754052 AREA: NORTH BUFFER ZONE CASING DIAMETER (IN): 6.00 GEOLOGIST: J.C. WRIGHT  
 EAST: 2084878 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 09/16/94  
 REMARKS: HSA TO 20 FEET, AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/30/94. LOG FROM CUTTINGS ONLY

69294

DEVIATION, BOREHOLE DEPTH  
 GRADATIONAL, BOREHOLE DEPTH  
 SAMPLE NUMBER

SAMPLE GRAIN SIZE PERCENT RECOVERY/INTERVAL DATUM (FT) DEPTH (FT) WELL OR PNEUMETER CONSTRUCTION LITHOLOGY UNIFIED SOILS CLASSIFICATION OR ROCK TYPE DESCRIPTION

20	20	100%	100%	220	
				21	
				22	
				23	
				24	
				25	
				26	
				27	
				28	
				29	
				30	
				31	
				32	
				33	
				34	
				35	
				36	
				37	
				38	
				39	
				40	
				41	
				42	
				43	
				44	
				45	
				46	
				47	
				48	
				49	
				50	
				51	
				52	
				53	
				54	
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				57	
				58	
				59	
				60	
				61	
				62	
				63	
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				65	
				66	
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				71	
				72	
				73	
				74	
				75	
				76	
				77	
				78	
				79	
				80	
				81	
				82	
				83	
				84	
				85	
				86	
				87	
				88	
				89	
				90	
				91	
				92	
				93	
				94	
				95	
				96	
				97	
				98	
				99	
				100	



STATE PLANE COORDINATE: TOTAL DEPTH (FT): 240.00 GROUND ELEVATION (FT): 5952.70 PROJECT NUMBER: WAPP LOG OF BORING NUMBER: 69294  
 NORTH: 754052 AREA: NORTH BUFFER ZONE CASING DIAMETER (IN): 6.00 GEOLOGIST: J.C. WRIGHT  
 EAST: 2084878 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 09/16/94  
 REMARKS: HSA TO 20 FEET, AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/30/94. LOG FROM CUTTINGS ONLY

WELL OR  
PIEZOMETER  
CONSTRUCTION

LITHOLOGY

UNITED STATES  
CLASSIFICATION  
OR ROCK TYPE

DESCRIPTION

DATE	TIME	DEPTH (FT)	DEPTH (FT)	RECOVERY INTERVAL	PERCENT RECOVERY	SAMPLE SIZE	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNITED STATES CLASSIFICATION OR ROCK TYPE	DESCRIPTION
		230								SILTY CLAYSTONE: 230-235'
		231								Silty claystone. Med. gray (M5). Argillaceous cement, slightly friable, moist.
		232								
		233								
		234								
		235								
		236								CLAYSTONE: 235-240'
		237								Claystone. Dark gray (M4). Argillaceous cement, nonfriable, slightly moist.
		238								
		239								
		240								

Total Depth Drilled: 240.00

EAST: 2085132

AREA: NORTH BUFFER ZONE

LOCATOR NUMBER: 0

GROUND ELEVATION (FT): 5948.30

CASING DIAMETER (IN): 6.00

BORE-HOLE DIAMETER (IN): 6.00

PROJECT NUMBER: WAGP

GEOLOGIST: J.C. WHIGHT

DATE DRILLED: 09/20/94

LOG OF BORING NUMBER:

69394

REMARKS: HSA TO 19 FEET, AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/29/94, LOG FROM CUTTINGS ONLY

SMALL  
GRAIN  
SIZE

PERCENT  
RECOVERYRECOVERY/  
INTERVAL

DATE	TIME	DEPTH (FT)	DATUM (FT)
10/10/19	10:00	10	10
10/10/19	10:05	15	15
10/10/19	10:10	20	20
10/10/19	10:15	25	25
10/10/19	10:20	30	30
10/10/19	10:25	35	35
10/10/19	10:30	40	40
10/10/19	10:35	45	45
10/10/19	10:40	50	50
10/10/19	10:45	55	55
10/10/19	10:50	60	60
10/10/19	10:55	65	65
10/10/19	11:00	70	70
10/10/19	11:05	75	75
10/10/19	11:10	80	80
10/10/19	11:15	85	85
10/10/19	11:20	90	90
10/10/19	11:25	95	95
10/10/19	11:30	100	100
10/10/19	11:35	105	105
10/10/19	11:40	110	110
10/10/19	11:45	115	115
10/10/19	11:50	120	120
10/10/19	11:55	125	125
10/10/19	12:00	130	130
10/10/19	12:05	135	135
10/10/19	12:10	140	140
10/10/19	12:15	145	145
10/10/19	12:20	150	150
10/10/19	12:25	155	155
10/10/19	12:30	160	160
10/10/19	12:35	165	165
10/10/19	12:40	170	170
10/10/19	12:45	175	175
10/10/19	12:50	180	180
10/10/19	12:55	185	185
10/10/19	13:00	190	190
10/10/19	13:05	195	195
10/10/19	13:10	200	200
10/10/19	13:15	205	205
10/10/19	13:20	210	210
10/10/19	13:25	215	215
10/10/19	13:30	220	220
10/10/19	13:35	225	225
10/10/19	13:40	230	230
10/10/19	13:45	235	235
10/10/19	13:50	240	240
10/10/19	13:55	245	245
10/10/19	14:00	250	250
10/10/19	14:05	255	255
10/10/19	14:10	260	260
10/10/19	14:15	265	265
10/10/19	14:20	270	270
10/10/19	14:25	275	275
10/10/19	14:30	280	280
10/10/19	14:35	285	285
10/10/19	14:40	290	290
10/10/19	14:45	295	295
10/10/19	14:50	300	300
10/10/19	14:55	305	305
10/10/19	15:00	310	310
10/10/19	15:05	315	315
10/10/19	15:10	320	320
10/10/19	15:15	325	325
10/10/19	15:20	330	330
10/10/19	15:25	335	335
10/10/19	15:30	340	340
10/10/19	15:35	345	345
10/10/19	15:40	350	350
10/10/19	15:45	355	355
10/10/19	15:50	360	360
10/10/19	15:55	365	365
10/10/19	16:00	370	370
10/10/19	16:05	375	375
10/10/19	16:10	380	380
10/10/19	16:15	385	385
10/10/19	16:20	390	390
10/10/19	16:25	395	395
10/10/19	16:30	400	400
10/10/19	16:35	405	405
10/10/19	16:40	410	410
10/10/19	16:45		

### WELL OR PIEZOMETER CONSTRUCTION

## LITHOLOGY

UNIFIED SOILS  
CLASSIFICATION  
OR ROCK TYPE**DESCRIPTION**

0:

45-55'

Clayey sandy silt with trace f.g. gravel. Light tan, highly calcareous caliche horizon. Dry.  
No recovery (0-4.5'), (5.5-7.5').

SILTY CLAYSTONE: 7.5-10'

Top of Bedrock. Silty claystone. Mod. yellow brown (10YR 5/4). Mod. calcareous, moist.



STATE PLANE COORDINATE: TOTAL DEPTH (FT): 240.00 GROUND ELEVATION (FT): 5948.30 PROJECT NUMBER: WAPP LOG OF BORING NUMBER: 69394  
 NORTH: 753985 AREA: NORTH BUFFER ZONE CASING DIAMETER (IN): 6.00 GEOLOGIST: J.C. WRIGHT  
 EAST: 2085132 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 09/20/94  
 REMARKS: HSA TO 19 FEET, AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/29/94, LOG FROM CUTTINGS ONLY

USING LOG SAMPLE DEPTH GRADATIONAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/ INTERVAL	DATUM(FT) DEPTH(FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNITED STATES CLASSIFICATION OR ROCK TYPE	DESCRIPTION
		5/8	100% CR	100%	10				
					11				
					12				
					13				
					14				
					15				
					16				
					17				
					18				
					19				
					20				

STATE PLANE COORDINATE:

NORTH: 753965

EAST: 2085132

TOTAL DEPTH (FT): 240.00

AREA: NORTH BUFFER ZONE

LOCATOR NUMBER: 0

GROUND ELEVATION (FT): 5948.30

CASING DIAMETER (IN): 6.00

BOREHOLE DIAMETER (IN): 6.00

PROJECT NUMBER: WRP

GEOLOGIST: J.C. WRIGHT

DATE DRILLED: 09/20/94

LOG OF BORING NUMBER:

69394

REMARKS: HSA TO 19 FEET, AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/29/94, LOG FROM CUTTINGS ONLY

SAMPLE  
GRAIN  
SIZEPERCENT  
RECOVERYRECOVERY/  
INTERVALDATE (FT)  
DEPTH (FT)WELL OR  
PIEZOMETER  
CONSTRUCTION

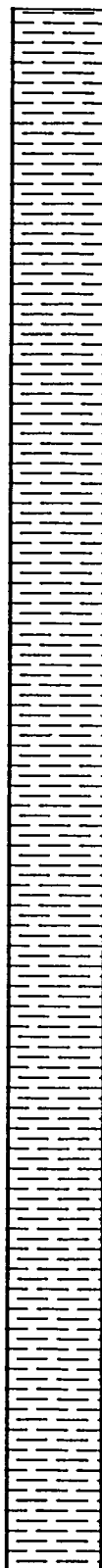
LITHOLOGY

UNITED SOILS  
CLASSIFICATION  
OR ROCK TYPE

DESCRIPTION

OVERLINE SAMPLE DEPTH  
GRADATIONAL SAMPLE DEPTH  
SAMPLE NUMBER

GR	50	100	100	DATE (FT)	DEPTH (FT)
					20
					21
					22
					23
					24
					25
					26
					27
					28
					29
					30



CLAYSTONE:

20-45'

Claystone. Pale yellow brown to mod. yellow brown in oxidized zone (10YR 6/2 to 10YR 5/4). Grayish black in unoxidized zones (N2). Argillaceous cement, moist.

STATE PLANE COORDINATE: TOTAL DEPTH (FT): 240.00 GROUND ELEVATION (FT): 5948.30 PROJECT NUMBER: WAPP LOG OF BORING NUMBER:  
 NORTH: 753985 AREA: NORTH BUFFER ZONE CASING DIAMETER (IN): 6.00 GEOLOGIST: J.C. WRIGHT  
 EAST: 2085132 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 09/20/94  
 REMARKS: HSA TO 19 FEET, AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/29/94, LOG FROM CUTTINGS ONLY

69394

DEPTH (FT)	DATE	TIME	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNITED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
30						
31						
32						
33						
34						
35						
36						
37						
38						
39						
40						

SAMPLE  
GRAIN  
SIZE

50

PERCENT  
RECOVERY

100

RECOVERY/  
INTERVAL

100

DATE

TIME

WELL OR

PIEZOMETER

CONSTRUCTION

LITHOLOGY

UNITED SOILS

CLASSIFICATION

OR ROCK TYPE

DESCRIPTION

STATE PLANE COORDINATE: TOTAL DEPTH (FT): 240.00 GROUND ELEVATION (FT): 5948.30 PROJECT NUMBER: WAPP LOG OF BORING NUMBER: 69394  
 NORTH: 753985 AREA: NORTH BUFFER ZONE CASING DIAMETER (IN): 6.00 GEOLOGIST: J.C. WRIGHT  
 EAST: 2085132 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 09/20/94  
 REMARKS: HSA TO 19 FEET, ADR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/29/94, LOG FROM CUTTINGS ONLY

CHRONOMETER DEPTH  
 GRADATIONAL SAMPLE DEPTH  
 SAMPLE NUMBER

SAMPLE  
 SIZE

PERCENT  
 RECOVERY

RECOVERY/  
 INTERVAL

DATUM(FT)  
 DEPTH(FT)

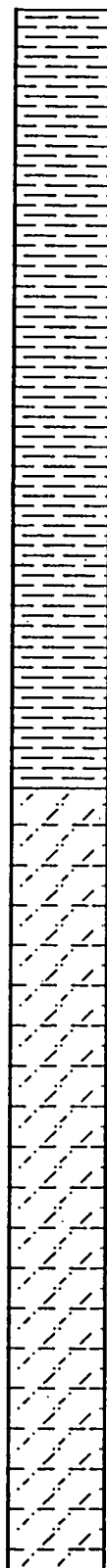
WELL OR  
 PNEUMETER  
 CONSTRUCTION

LITHOLOGY

UNITED SOILS  
 CLASSIFICATION  
 OR ROCK TYPE

DESCRIPTION

4	4	100	100	4	sab8	4	sab7	4	sab6	4	sab5	4	sab4	4	sab3	4	sab2	4	sab1	4	sab0	4	sab9	4
---	---	-----	-----	---	------	---	------	---	------	---	------	---	------	---	------	---	------	---	------	---	------	---	------	---



CLAYEY SILTSTONE: 45-55'

Clayey siltstone to siltstone. Med. dark gray (M4).  
 Argillaceous cement, moist, weakly friable. Weakly  
 calcareous at 50-55'.

69394

SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/ INTERVAL	DATUM(FT)	DEPTH(FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNITED STATES CLASSIFICATION OR ROCK TYPE	DESCRIPTION
5/16	100% OR	100%	5058	50				
			5058	51				
			5057	51				
			5056	52				
			5055	53				
			5054	54				
			5053	55				
			5052	56				
			5051	57				
			5050	58				
			5049	59				
				60				



STATE PLANE COORDINATE: TOTAL DEPTH (FT): 240.00 GROUND ELEVATION (FT): 5948.30 PROJECT NUMBER: WRP LOG OF BORING NUMBER: 69394  
 NORTH: 753965 AREA: NORTH BUFFER ZONE CASING DIAMETER (IN): 6.00 GEOLOGIST: J.C. WRIGHT  
 EAST: 2085132 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 09/20/94  
 REMARKS: HSA TO 19 FEET, AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/29/94, LOG FROM CUTTINGS ONLY

CHERIAL BOREHOLE DEPTH  
 GRADATIONAL BOREHOLE DEPTH  
 SAMPLE NUMBER

DEPTH (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
70	5878				
71	5877				
72	5876				
73	5875				
74	5874				
75	5873				
76	5872				
77	5871				
78	5870				
79	5869				

STATE PLANE COORDINATE:

NORTH: 753965

EAST: 2065132

TOTAL DEPTH (FT): 240.00

AREA: NORTH BUFFER ZONE

LOCATOR NUMBER: 0

GROUND ELEVATION (FT): 5948.30

CASING DIAMETER (IN): 6.00

BOREHOLE DIAMETER (IN): 6.00

PROJECT NUMBER: WAPP

GEOLOGIST: J.C. WRIGHT

DATE DRILLED: 09/20/94

LOG OF BOREHOLE NUMBER:

69394

REMARKS: HSA TO 19 FEET, AIR ROTARY TO TD, J.C. WRIGHT, SCP SPEC. BOREHOLE, ABANDONED 9/29/94, LOG FROM CUTTINGS ONLY

SAMPLE  
GRAIN  
SIZEPERCENT  
RECOVERYRECOVERY/  
INTERVALDATE (FT)  
DEPTH (FT)WELL OR  
PIEZOMETER  
CONSTRUCTION

LITHOLOGY

UNIFIED SOILS  
CLASSIFICATION  
OR ROCK TYPE

DESCRIPTION

SILTY CLAYSTONE: 80-110'

Silty claystone to clayey siltstone. Med. gray to med. dark gray (N5-N4). Slightly friable, argillaceous cement.



STATE PLANE COORDINATE: TOTAL DEPTH (FT): 240.00 GROUND ELEVATION (FT): 598.30 PROJECT NUMBER: WAP LOG OF BORING NUMBER:  
 NORTH: 753985 AREA: NORTH BUFFER ZONE CASING DIAMETER (IN): 6.00 GEOLOGIST: J.C. WRIGHT  
 EAST: 2085132 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 09/20/94  
 REMARKS: HSA TO 19 FEET, AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/23/94, LOG FROM CUTTINGS ONLY

69394

DEPTH (FT)	DATE (MM/YY)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNITED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
90	5858				
91	5857				
92	5856				
93	5855				
94	5854				
95	5853				
96	5852				
97	5851				
98	5850				
99	5849				
100					

SWAYLE  
BRAND  
SIZE

58

PERCENT  
RECOVERY

100

RECOVERY/  
INTERVAL

100



STATE PLANE COORDINATE: TOTAL DEPTH (FT): 240.00 GROUND ELEVATION (FT): 5948.30 PROJECT NUMBER: WAPP LOG OF BORING NUMBER: 69394  
 NORTH: 753965 AREA: NORTH BUFFER ZONE CASING DIAMETER (IN): 6.00 GEOLOGIST: J.C. WRIGHT  
 EAST: 2085132 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 09/20/94  
 REMARKS: HSA TO 19 FEET, AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/29/94, LOG FROM CUTTINGS ONLY

CHEMICAL ANALYSIS		SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/ INTERVAL	DATE/DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
DEPTH (FT)	GRAIN SIZE								
110	100% or less				110				
111	100% or less				111				
112	100% or less				112				
113	100% or less				113				
114	100% or less				114				
115	100% or less				115				
116	100% or less				116				
117	100% or less				117				
118	100% or less				118				
119	100% or less				119				
120	100% or less				120				

CLAYSTONE:

110-130'

Claystone. Dark gray to grayish black (N3-N2). Nonfriable, waxy, variably carbonaceous.

STATE PLANE COORDINATE: TOTAL DEPTH (FT): 240.00 GROUND ELEVATION (FT): 598.30 PROJECT NUMBER: WAPP LOG OF BORING NUMBER: 69394  
 NORTH: 753985 AREA: NORTH BUFFER ZONE CASING DIAMETER (IN): 6.00 GEOLOGIST: J.C. WRIGHT  
 EAST: 2085132 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 09/20/94  
 REMARKS: 16A TO 19 FEET, AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/29/94, LOG FROM CUTTINGS ONLY

CHERON BOREHOLE DEPTH  
 GRADATIONAL BOREHOLE DEPTH  
 BOREHOLE NUMBER

CHERON BOREHOLE DEPTH GRADATIONAL BOREHOLE DEPTH BOREHOLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/ INTERVAL	DATUM (FT) DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNITED STATES CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	SO	100 OR	100	120				
				121				
				122				
				123				
				124				
				125				
				126				
				127				
				128				
				129				
				130				

STATE PLANE COORDINATE:

NORTH: 753985

EAST: 2085132

TOTAL DEPTH (FT): 240.00

AREA: NORTH BUFFER ZONE

LOCATOR NUMBER: 0

GROUND ELEVATION (FT): 5948.30

CASING DIAMETER (IN): 6.00

BOREHOLE DIAMETER (IN): 6.00

PROJECT NUMBER: WFP

GEOLOGIST: J.C. WRIGHT

DATE DRILLED: 09/20/94

LOG OF BOREHOLE NUMBER:

69394

REMARKS: HSA TO 19 FEET, AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/29/94, LOG FROM CUTTINGS ONLY

SAMPLE  
GRAIN  
SIZEPERCENT  
RECOVERYRECOVERY/  
INTERVALDATE/TIME  
DEPTH (FT)WELL OR  
PIEZOMETER  
CONSTRUCTION

LITHOLOGY

UNITED STATES  
CLASSIFICATION  
OR ROCK TYPE

DESCRIPTION

CLAYEY SILTSTONE: 130-135'

Clayey siltstone. Med. dark gray (N4). Slightly friable, argillaceous cement.

CLAYSTONE: 135-150'

Claystone. Dark gray (N3). Waxy, argillaceous cement.

STATE PLANE COORDINATE: TOTAL DEPTH (FT): 240.00 GROUND ELEVATION (FT): 5948.30 PROJECT NUMBER: WAPP LOG OF BORING NUMBER: 69394  
 NORTH: 753985 AREA: NORTH BUFFER ZONE CASING DIAMETER (IN): 6.00 GEOLOGIST: J.C. WRIGHT  
 EAST: 2085132 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 09/20/94  
 REMARKS: 16A TO 19 FEET, AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/29/94, LOG FROM CUTTINGS ONLY

CHANGING SAMPLE DEPTH  
 GRADATIONAL SAMPLE DEPTH

SAMPLE NUMBER

SAMPLE  
 GRAIN  
 SIZE

PERCENT  
 RECOVERY

RECOVERY/  
 INTERVAL

DATUM(FT)  
 DEPTH(FT)

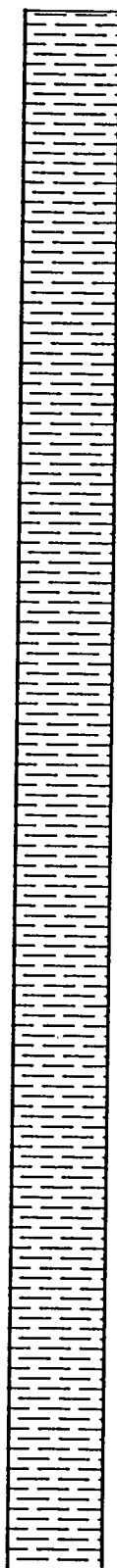
WELL OR  
 PIEZOMETER  
 CONSTRUCTION

LITHOLOGY

UNIFIED SOILS  
 CLASSIFICATION  
 OR ROCK TYPE

DESCRIPTION

13	100	100	140	sab8
14	100	100	141	sab7
15	100	100	142	sab6
16	100	100	143	sab5
17	100	100	144	sab4
18	100	100	145	sab3
19	100	100	146	sab2
20	100	100	147	sab1
21	100	100	148	sab0
22	100	100	149	sab9
23	100	100	150	



STATE PLANE COORDINATE: TOTAL DEPTH (FT): 240.00 GROUND ELEVATION (FT): 598.30 PROJECT NUMBER: WARP LOG OF BORING NUMBER: 69394  
 NORTH: 753985 AREA: NORTH BUFFER ZONE CASING DIAMETER (IN): 6.00 GEOLOGIST: J.C. WRIGHT  
 EAST: 2065132 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 09/20/94  
 REMARKS: HSA TO 19 FEET, AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/29/94, LOG FROM CUTTINGS ONLY

CHEMICAL ANALYSIS DEPTH  
 GRADATIONAL SCALE DEPTH  
 SAMPLE NUMBER

SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY INTERVAL	DATUM (FT)	DEPTH (FT)
2	100%	100%		150
5				151
10				152
20				153
40				154
60				155
80				156
100				157
120				158
140				159
160				160

WELL OR  
 PIEZOMETER  
 CONSTRUCTION

LITHOLOGY

UNIFIED SOILS  
 CLASSIFICATION  
 OR ROCK TYPE

DESCRIPTION

CLAYEY SILTSTONE: 150-155'

Clayey siltstone. Med. dark gray (M4). Slightly friable, argillaceous cement.

SILTY CLAYSTONE: 155-220'

Silty claystone. Med. dark gray to dark gray (M4-M3). Argillaceous cement.

STATE PLANE COORDINATE: TOTAL DEPTH (FT): 240.00 GROUND ELEVATION (FT): 598.30 PROJECT NUMBER: WAPP LOG OF BORING NUMBER:  
 NORTH: 753965 AREA: NORTH BUFFER ZONE CASING DIAMETER (IN): 6.00 GEOLOGIST: J.C. WRIGHT  
 EAST: 2085132 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 09/20/94  
 REMARKS: H&A TO 19 FEET, AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/29/94, LOG FROM CUTTINGS ONLY

69394

CHEMICAL SAMPLE DEPTH  
 GRADATIONAL  
 SAMPLE NUMBER

SAMPLE GRAIN SIZE  
 PERCENT RECOVERY  
 RECOVERY INTERVAL  
 DATUM (FT)  
 DEPTH (FT)  
 WELL OR PIEZOMETER CONSTRUCTION  
 LITHOLOGY  
 UNIFIED SOILS CLASSIFICATION OR ROCK TYPE  
 DESCRIPTION

160  
 5758  
 161  
 5757  
 162  
 5756  
 163  
 5755  
 164  
 5754  
 165  
 5753  
 166  
 5752  
 167  
 5751  
 168  
 5750  
 169  
 5749  
 170

160  
 5758  
 161  
 5757  
 162  
 5756  
 163  
 5755  
 164  
 5754  
 165  
 5753  
 166  
 5752  
 167  
 5751  
 168  
 5750  
 169  
 5749  
 170









STATE PLANE COORDINATE: TOTAL DEPTH (FT): 240.00 GROUND ELEVATION (FT): 598.30 PROJECT NUMBER: WAP LOG OF BORING NUMBER: 69394  
 NORTH: 75395 AREA: NORTH BUFFER ZONE CASING DIAMETER (IN): 6.00 GEOLOGIST: J.C. WRIGHT  
 EAST: 2085132 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 09/20/94  
 REMARKS: HSA TO 19 FEET, AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/29/94, LOG FROM CUTTINGS ONLY

CHECKED SAMPLE DEPTH  
 GRADATIONAL SAMPLE DEPTH  
 SAMPLE NUMBER

SAMPLE GRAIN SIZE PERCENT RECOVERY RECOVERY INTERVAL DATE/DEPTH (FT) WELL OR PIEZOMETER CONSTRUCTION LITHOLOGY UNIFIED SOILS CLASSIFICATION OR ROCK TYPE DESCRIPTION

GR	SOX	100% OF	100%		200				
					5748				
					201				
					5747				
					202				
					5746				
					203				
					5745				
					204				
					5744				
					205				
					5743				
					206				
					5742				
					207				
					5741				
					208				
					5740				
					209				
					5739				
					210				

STATE PLANE COORDINATE: TOTAL DEPTH (FT): 240.00 GROUND ELEVATION (FT): 598.30 PROJECT NUMBER: WAPP LOG OF BORING NUMBER:  
 NORTH: 753985 AREA: NORTH BUFFER ZONE CASING DIAMETER (IN): 6.00 GEOLOGIST: J.C. WRIGHT  
 EAST: 2085132 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 09/20/94  
 REMARKS: HSA TO 19 FEET, AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/29/94, LOG FROM CUTTINGS ONLY

69394

CHIEF OF BORING DEPT  
 GRADATIONAL BORING DEPT  
 BORING NUMBER

SAMPLE  
 GRAIN  
 SIZE

PERCENT  
 RECOVERY

RECOVERY/  
 INTERVAL

DATUM (FT)  
 DEPTH (FT)

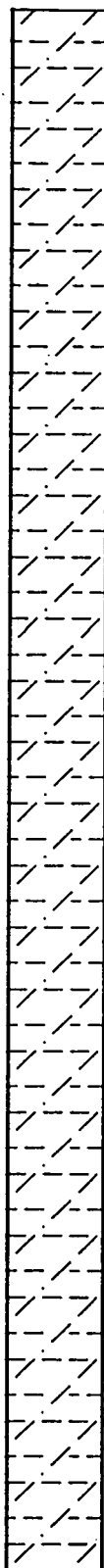
WELL OR  
 PIEZOMETER  
 CONSTRUCTION

LITHOLOGY

UNIFIED SOILS  
 CLASSIFICATION  
 OR ROCK TYPE

DESCRIPTION

GR	SR	100% OR	100%	210
				5738
				211
				5737
				212
				5736
				213
				5735
				214
				5734
				215
				5733
				216
				5732
				217
				5731
				218
				5730
				219
				5729
				220



STATE PLANE COORDINATE: TOTAL DEPTH (FT): 240.00 GROUND ELEVATION (FT): 5948.30 PROJECT NUMBER: WRP LOG OF BORING NUMBER: 69394  
 NORTH: 753965 AREA: NORTH BUFFER ZONE CASING DIAMETER (IN): 6.00 GEOLOGIST: J.C. WRIGHT  
 EAST: 2085132 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 09/20/94  
 REMARKS: HSA TO 19 FEET, AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/29/94, LOG FROM CUTTINGS ONLY

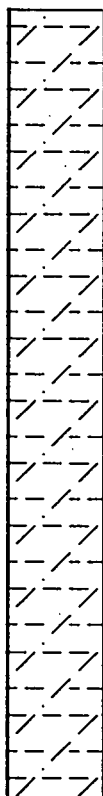
SECTION - BOREHOLE DEPTH GRADATIONAL SCALE DEPTH	SAMPLE BRIN SIZE	PERCENT RECOVERY	RECOVERY/ INTERVAL	DATUM(FT) DEPTH(FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNITED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
				220				SILTY CLAYSTONE: 220-235'
				5728				Silty claystone. Similar to 155-220', but siltier.
				221				
				5727				
				222				
				5726				
				223				
				5725				
				224				
				5724				
				225				
				5723				
				226				
				5722				
				227				
				5721				
				228				
				5720				
				229				
				5719				
				230				

STATE PLANE COORDINATE: TOTAL DEPTH (FT): 240.00 GROUND ELEVATION (FT): 5948.30 PROJECT NUMBER: WAPP LOG OF BORING NUMBER: 69394  
 NORTH: 753985 AREA: NORTH BUFFER ZONE CASING DIAMETER (IN): 6.00 GEOLOGIST: J.C. WRIGHT  
 EAST: 2085132 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 09/20/94  
 REMARKS: 16A TO 19 FEET, AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/29/94, LOG FROM CUTTINGS ONLY

CHECKED: SAMPLE DEPTH  
 GRADATIONAL SAMPLE DEPTH  
 SAMPLE NUMBER

SAMPLE GRAIN SIZE PERCENT RECOVERY RECOVERY INTERVAL DATUM (FT) DEPTH (FT) WELL OR PIEZOMETER CONSTRUCTION LITHOLOGY UNIFIED SOILS CLASSIFICATION OR ROCK TYPE DESCRIPTION

230	5718	231	5717	232	5716	233	5715	234	5714	235	5713	236	5712	237	5711	238	5710	239	5709	240
-----	------	-----	------	-----	------	-----	------	-----	------	-----	------	-----	------	-----	------	-----	------	-----	------	-----



CLAYSTONE: 235-240'  
 Claystone. Dark gray to grayish black (M3-12). Waxy, nonfriable, argillaceous cement.

Total Depth Drilled: 240.00

## STATE PLANE COORDINATE:

NORTH: 754163

EAST: 2084768

REMARKS: HSA TO 20 FEET, AIR ROTARY TO TD, J.C. WRIGHT, SP. SPEC. BARREILLE, REMOVED 10/2/94. LOG FROM CUTTINGS ONLY.

TOTAL DEPTH (FT): 230.10

HSA: NORTH BUFFER ZONE

LOCATOR NUMBER: 0

GROUND ELEVATION (FT): 5554.40

CASING DIAMETER (IN): 6.00

BOREHOLE DIAMETER (IN): 6.00

PROJECT NUMBER: WAP

GEOLOGIST: J.C. WRIGHT

DATE DRILLED: 09/26/94

LOG OF BORING NUMBER:

69494

DEPT. BOREHOLE DEPTH  
SAMPLE NUMBERSAMPLE  
SIZEPERCENT  
RECOVERYRECOVERY  
INTERVAL

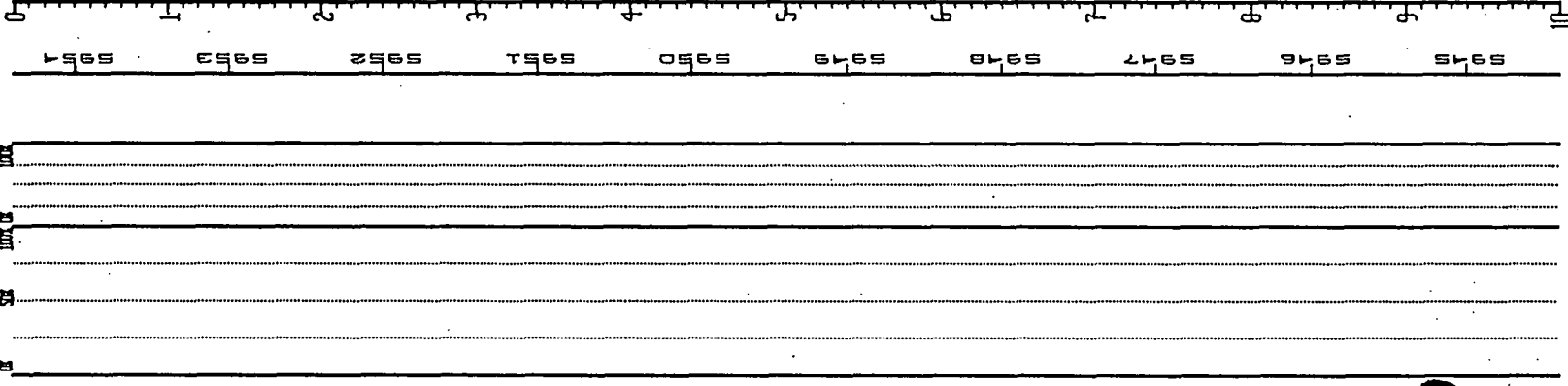
DATE (YR/MT/DT)

CELL OR  
PIEZOMETER  
CONSTRUCTION

LITHOLOGY

UNITED STATES  
CLASSIFICATION  
OR ROCK TYPE

DESCRIPTION



94:

4.5-5.5'

Gravelly sand with some silt and clay. Pale yellowish brown (MNR 6/2). Gravel is dominantly subround f.g. Sand ranges from c.g. to f.g., well graded. Material is highly calcareous - a calcareous rich zone. Moist. No recovery (0-4.5'), (5.5-9.5').

94:

9.5-10.5'

Gravelly sand. Dark yellowish orange (MNR 6/6). Gravel is f.g. to n.g., subrounded. Sand is f.g. to c.g., well graded. Weakly calcareous. Moist. No recovery (10.5-13.5').



EAST: 2084768

AREA: NORTH BUFFER ZONE

LOCATOR NUMBER: 0

GROUND ELEVATION (FT): 5954.40

CASING DIAMETER (IN): 6.00

BOREHOLE DIAMETER (IN): 6.00

PROJECT NUMBER: UNRP

GEOLOGIST: J.C. WRIGHT

DATE ORILLED: 09/26/94

LOG OF BORING NUMBER:

69494

REMARKS: HSA TO 20 FEET, ATR ROTARY TO TD. J.C. WRIGHT, SEP SPEC. BOREHOLE ABANDONED 10/3/94. LOG FROM CUTTINGS ONLY.

CHEMICAL SAMPLE DEPTH  
GRADATIONAL SAMPLE DEPTH

**SAMPLE NUM**

SMALL  
GRAIN  
SIZE

PERCENT  
RECOVERY

RECOVERY /  
INTERVAL

DEPTH(FT)  
DATHUM(FT)

WELL OR  
PIEZOMETER  
CONSTRUCTION

## LITHOLOGY

UNIFIED SOILS  
CLASSIFICATION  
OR ROCK TYPE

**DESCRIPTION**

1:4

578

100% OK

100

10

09/29/94



CLAYSTONE:

13.5-20'

Top of Bedrock. Claystone with abundant f.g. gravel clasts and c.g. sand. Dark yellowish orange (10YR 5/6). Noncalcareous, wet. Gravel and sand content probably due to comminution by augers.

LOG OF BORING NUMBER:

69494

DATE DRILLED: 09/26/94

REMARKS: 15A TO 20 FEET, ATR ROTARY TO TD. J.C. WRIGHT, SEP SPEC. BOPEHOLE. ABANDONED 10/3/94. LOG FROM CUTTINGS ONLY.

### DESCRIPTION

Claystone. Dark yellow orange to pale yellow brown (10YR 6/6 to 10YR 6/2) in oxidized zone and red. dark gray to grayish black (N4-N2) in unoxidized zone. Argillaceous cement, slightly moist. Carbonaceous interbeds from 45-55'. Bottom of weathered zone at 35 ft.

STATE PLANE COORDINATE: NORTH: 754163 EAST: 2084768 TOTAL DEPTH (FT): 230.00 AREA: NORTH BUFFER ZONE LOCATOR NUMBER: 0 GROUND ELEVATION (FT): 5554.40 CASING DIAMETER (IN): 6.00 BOREHOLE DIAMETER (IN): 6.00 PROJECT NUMBER: WAPP GEOLOGIST: J.C. WRIGHT DATE DRILLED: 09/26/94 LOG OF BORING NUMBER: 69494

REMARKS: HSA TO 20 FEET, AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 10/3/94. LOG FROM CUTTINGS ONLY.

VERTICAL SCALE DEPTH  
GRADATIONAL SAMPLE DEPTH  
SAMPLE NUMBER

DEPTH (FT)	DATE	TIME	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
30	09/26/94	14:00				
31	09/26/94	14:00				
32	09/26/94	14:00				
33	09/26/94	14:00				
34	09/26/94	14:00				
35	09/26/94	14:00				
36	09/26/94	14:00				
37	09/26/94	14:00				
38	09/26/94	14:00				
39	09/26/94	14:00				
40	09/26/94	14:00				

LOG OF BOARDING NUMBER:

69494

DATE DRILLED: 09/26/94

REMARKS: HSA TO 20 FEET, AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE ABANDONED 10/3/94. LOG FROM CUTTINGS ONLY.

69494

**DESCRIPTION:**

69494

SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY INTERVAL	DATUM (FT) DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNITED STATES CLASSIFICATION OR ROCK TYPE	DESCRIPTION
5/8	100	100	50				
			51				
			52				
			53				
			54				
			55				
			56				
			57				
			58				
			59				
			60				
			61				
			62				
			63				
			64				
			65				
			66				
			67				
			68				
			69				
			70				
			71				
			72				
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			77				
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			80				
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			82				
			83				
			84				
			85				
			86				
			87				
			88				
			89				
			90				
			91				
			92				
			93				
			94				
			95				
			96				
			97				
			98				
			99				
			100				

STATE PLANE COORDINATE: TOTAL DEPTH (FT): 230.00 GROUND ELEVATION (FT): 5954.40 PROJECT NUMBER: WRP LOG OF BORING NUMBER: 69494  
 NORTH: 754163 AREA: NORTH BUFFER ZONE CASING DIAMETER (IN): 6.00 GEOLOGIST: J.C. WRIGHT  
 EAST: 2084768 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 09/26/94  
 REMARKS: HSA TO 20 FEET, AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 10/3/94. LOG FROM CUTTINGS ONLY.

CHECKED SAMPLE DEPTH  
 GRADATIONAL SAMPLE DEPTH  
 SAMPLE NUMBER

SAMPLE  
 GRAIN  
 SIZE

PERCENT  
 RECOVERY

RECOVERY/  
 INTERVAL

DATUM (FT)  
 DEPTH (FT)

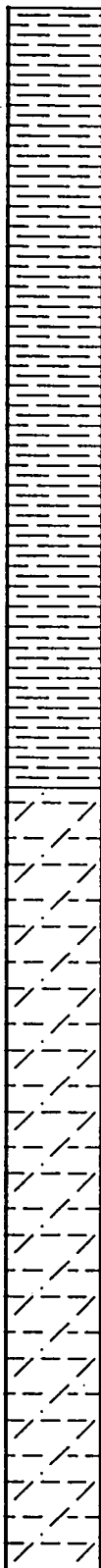
WELL OR  
 PNEUMETER  
 CONSTRUCTION

LITHOLOGY

UNIFIED SOILS  
 CLASSIFICATION  
 OR ROCK TYPE

DESCRIPTION

60	5851	61	5853	62	5852	63	5851	64	5850	65	5855	66	5858	67	5857	68	5856	69	5855	70	5855
----	------	----	------	----	------	----	------	----	------	----	------	----	------	----	------	----	------	----	------	----	------



SILTY CLAYSTONE: 65-80'  
 Silty claystone. Med. dark gray (M4). Argillaceous cement, slightly friable, dry.

EAST: 2084768

LOCATOR NUMBER: 0

BORE-HOLE DIAMETER (CM): 6.00

DATE ORILED: 09/26/94

LOG OF BOARDING NUMBER:

69494

REMARKS: HSA TO 20 FEET, AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 10/3/94. LOG FROM CUTTINGS ONLY.

SNYPLE  
BRAD  
SIDE

PERCENT  
RECOVERYRECOVERY /  
INTERVAL

DATUM(FT)

### WELL OR PIEZOMETER CONSTRUCTION

## LITERATURE

UNITED SOILS  
CLASSIFICATION  
OR ROCK TYPE**DESCRIPTION**

CHEMICAL SAMPLE DEPTH  
GRADUATIONAL SAMPLE DEPTH  
SAMPLE NUMBER

[illegible]

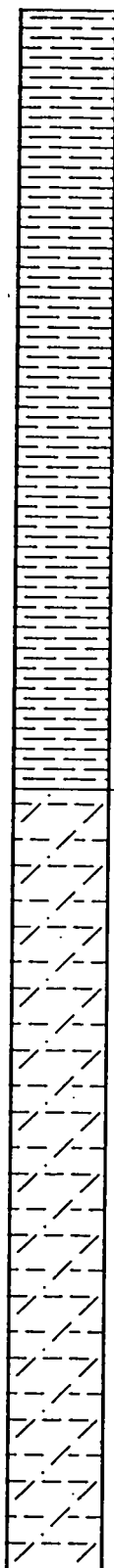




STATE PLANE COORDINATE: TOTAL DEPTH (FT): 230.00 GROUND ELEVATION (FT): 5554.40 PROJECT NUMBER: WAPP LOG OF BORING NUMBER:  
 NORTH: 754163 AREA: NORTH BUFFER ZONE CASING DIAMETER (IN): 6.00 GEOLOGIST: J.C. WRIGHT 69494  
 EAST: 2084768 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 09/26/94  
 REMARKS: HSA TO 20 FEET, AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 10/3/94. LOG FROM CUTTINGS ONLY.

CHANGING SAMPLE DEPTH  
 GRADATIONAL SAMPLE DEPTH  
 SAMPLE NUMBER  
 SAMPLE GRAIN SIZE  
 PERCENT RECOVERY  
 RECOVERY INTERVAL  
 DATUM (FT)  
 DEPTH (FT)  
 WELL OR PNEUMETER CONSTRUCTION  
 LITHOLOGY  
 UNIFIED SOILS CLASSIFICATION OR ROCK TYPE  
 DESCRIPTION

90  
91  
92  
93  
94  
95  
96  
97  
98  
99  
100  
 5051 5052 5053 5054 5055 5056 5057 5058 5059 5060 5061 5062 5063 5064



SILTY CLAYSTONE: 95-105'

Silty claystone. Med. dark gray to grayish black (M4-M2).  
 Argillaceous cement, weakly friable, dry.

LOG OF BORDING NUMBER:

J.C. WRIGHT

DATE ORILED: 09/26/94

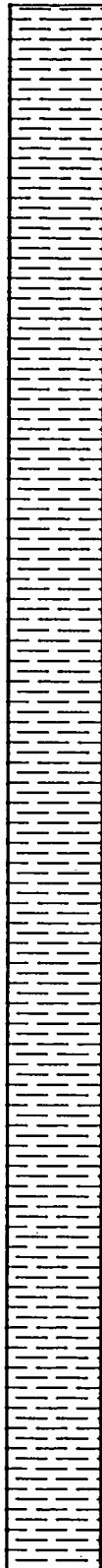
69494

**DESCRIPTION**[illegible]

STATE PLANE COORDINATE: TOTAL DEPTH (FT): 230.00 GROUND ELEVATION (FT): 5554.40 PROJECT NUMBER: WAPP LOG OF BORING NUMBER: 69494  
 NORTH: 754163 AREA: NORTH BUFFER ZONE CASING DIAMETER (IN): 6.00 GEOLOGIST: J.C. WRIGHT  
 EAST: 2084768 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 09/26/94  
 REMARKS: 16A TO 20 FEET, AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 10/3/94. LOG FROM CUTTINGS ONLY.

CHRONOLOGICAL SAMPLE DEPTH  
 GRADATIONAL SAMPLE DEPTH  
 SAMPLE NUMBER  
 SAMPLE GRAIN SIZE  
 PERCENT RECOVERY  
 RECOVERY/INTERVAL  
 DATUM (FT)  
 DEPTH (FT)  
 WELL OR PIEZOMETER CONSTRUCTION  
 LITHOLOGY  
 UNIFIED SOILS CLASSIFICATION OR ROCK TYPE  
 DESCRIPTION

GR	50	100	100	110
				SB11
				11
				SB13
				112
				SB12
				113
				SB11
				114
				SB10
				115
				SB39
				116
				SB38
				117
				SB37
				118
				SB36
				119
				SB35
				120



STATE PLANE COORDINATE: TOTAL DEPTH (FT): 230.00 GROUND ELEVATION (FT): 5954.40 PROJECT NUMBER: WAPP LOG OF BORING NUMBER: 69494  
 NORTH: 754163 AREA: NORTH BUFFER ZONE CASING DIAMETER (IN): 6.00 GEOLOGIST: J.C. WRIGHT  
 EAST: 2084768 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 09/26/94  
 REMARKS: HSA TO 20 FEET, AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 10/3/94. LOG FROM CUTTINGS ONLY.

CHIEF OF BORING DEPT  
 GRADATIONAL BATHY DEPTH

BATHY NUMB

SAMPLE  
 GRAIN  
 SIZE

SK

100% OR

PERCENT  
 RECOVERY

100%

RECOVERY/  
 INTERVAL

DATUM(FT)

DEPTH(FT)

WELL OR  
 PIEZOMETER  
 CONSTRUCTION

LITHOLOGY

UNITED SOILS  
 CLASSIFICATION  
 OR ROCK TYPE

DESCRIPTION

120  
 121  
 122  
 123  
 124  
 125  
 126  
 127  
 128  
 129  
 130



STATE PLANE COORDINATE: TOTAL DEPTH (FT): 230.00 GROUND ELEVATION (FT): 5954.40 PROJECT NUMBER: WRP LOG OF BORING NUMBER:  
 NORTH: 754163 AREA: NORTH BUFFER ZONE CASING DIAMETER (IN): 6.00 GEOLOGIST: J.C. WRIGHT  
 EAST: 2084768 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 09/26/94  
 REMARKS: HSA TO 20 FEET, AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 10/3/94. LOG FROM CUTTINGS ONLY.

69494

VERTICAL SAMPLE DEPTH  
 GRADATIONAL SAMPLE DEPTH  
 SAMPLE NUMBER

SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/ INTERVAL	DATE (M/T)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNITED STATES CLASSIFICATION OR ROCK TYPE	DESCRIPTION
OK	OK	OK		130				
				131				
				132				
				133				
				134				
				135				
				136				
				137				
				138				
				139				
				140				

STATE PLANE COORDINATE: TOTAL DEPTH (FT): 230.00 GROUND ELEVATION (FT): 5954.40 PROJECT NUMBER: WHP LOG OF BORING NUMBER: 69494  
 NORTH: 754163 AREA: NORTH BUFFER ZONE CASING DIAMETER (IN): 6.00 GEOLOGIST: J.C. WRIGHT  
 EAST: 2084768 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 09/26/94  
 REMARKS: HSA TO 20 FEET, ADR ROTARY TO TD, J.C. WRIGHT, SCP SPEC. BOREHOLE, ABANDONED 10/3/94. LOG FROM CUTTINGS ONLY.

CREW NAME: SAMPLE DEPTH  
 GRADATIONAL SAMPLE DEPTH  
 SAMPLE NUMBER

SAMPLE GRAIN SIZE

PERCENT RECOVERY

RECOVERY INTERVAL

DATUM (FT) DEPTH (FT)

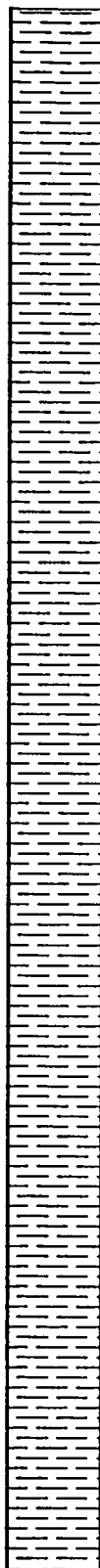
WELL OR PIEZOMETER CONSTRUCTION

LITHOLOGY

UNITED STATES CLASSIFICATION OR ROCK TYPE

DESCRIPTION

2	50	100	100	140
				141
				142
				143
				144
				145
				146
				147
				148
				149
				150



LOG OF BORING NUMBER:

J.C. WRIGHT

DATE ORILLED: 09/26/94

REMARKS: 15A TO 20 FEET, ADR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE ABANDONED 10/3/94. LOG FROM CUTTINGS ONLY.

69494

**SAMPLE NUMBER**

SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/ INTERVAL	DATE (FT) DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNITED STATES CLASSIFICATION OR ROCK TYPE	DESCRIPTION
50%	100%	100%	150			SILTY CLAYSTONE: 150-160	Silty claystone slightly from 150
			151				
			152				
			153				
			154				
			155				
			156				
			157				
			158				
			159				
			160				

STATE PLANE COORDINATE: TOTAL DEPTH (FT): 230.00 GROUND ELEVATION (FT): 5954.40 PROJECT NUMBER: WAPP LOG OF BOREHOLE NUMBER: 69494  
 NORTH: 754163 AREA: NORTH BUFFER ZONE CASING DIAMETER (IN): 6.00 GEOLOGIST: J.C. WRIGHT  
 EAST: 2084768 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 09/25/94  
 REMARKS: HSA TO 20 FEET, AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 10/3/94. LOG FROM CUTTINGS ONLY.

USE THIS COLUMN TO RECORD  
 GRADATIONAL SAMPLE DEPTH

SAMPLE NUMBER

SAMPLE  
 GRAIN  
 SIZE

PERCENT  
 RECOVERY

RECOVERY/  
 INTERVAL

DATE (FT)  
 DEPTH (FT)

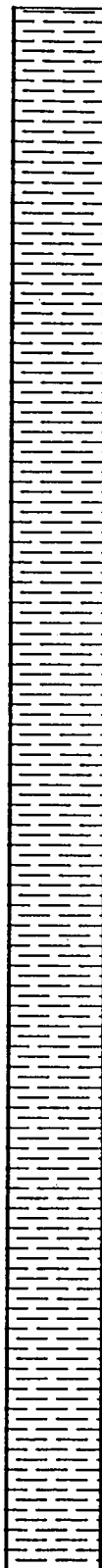
WELL OR  
 PIEZOMETER  
 CONSTRUCTION

LITHOLOGY

UNITED STATES  
 CLASSIFICATION  
 OR ROCK TYPE

DESCRIPTION

160	5754	100%	100%	160
161	5753			161
162	5752			162
163	5751			163
164	5750			164
165	5749			165
166	5748			166
167	5747			167
168	5746			168
169	5745			169
170				170



CLAYSTONE: 160-175'  
 Claystone. Dark gray to grayish black (M3-M2).  
 Argillaceous cement, nonfriable, slightly moist to dry.



STATE PLANE COORDINATE: NORTH: 754163 EAST: 2084768 TOTAL DEPTH (FT): 230.00 AREA: NORTH BUFFER ZONE LOCATOR NUMBER: 0 GROUND ELEVATION (FT): 5354.40 CASING DIAMETER (IN): 6.00 BOREHOLE DIAMETER (IN): 6.00 PROJECT NUMBER: WAPP GEOLOGIST: J.C. WRIGHT DATE DRILLED: 09/26/94 LOG OF BORING NUMBER: 69494

REMARKS: HSA TO 20 FEET, AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 10/3/94. LOG FROM CUTTINGS ONLY.

DEPTH (FT)	DATE (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNITED STATES CLASSIFICATION OR ROCK TYPE	DESCRIPTION
170	5754				
171	5753				
172	5752				
173	5751				
174	5750				
175	5749				
176	5748				
177	5747				
178	5746				
179	5745				
180					

#### SILTY CLAYSTONE: 175-185'

Silty claystone. Med. dark gray to dark gray (N4-N3).  
Argillaceous cement, slightly friable, dry. Thin siltstone  
interbed from approx. 180-182'.

69494

USEFULNESS GRADATION	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/ INTERVAL	DATUM (FT) DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNITED STATES CLASSIFICATION OR ROCK TYPE	DESCRIPTION
		GR			180				
		SM			181				
		100% GR			182				
		100%			183				
					184				
					185				
					186				
					187				
					188				
					189				
					190				
					191				
					192				
					193				
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					232				
					233				
					234				
					235				
					236				
					237				
					238				
					239				
					240				
					241				
					242				
					243				
				</					

LOG OF BOARDING NUMBER:

69494

DATE DROILED: 09/26/94

69494

SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY INTERVAL	DATUM (FT) DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNITED STATES CLASSIFICATION OR ROCK TYPE	DESCRIPTION
SIX	100% OR	100%	190			SILTY CLAYSTONE:	190-195
			191				Silty claystone, slightly
			192				
			193				
			194				
			195				
			196			CLAYSTONE:	195-200
			197				Claystone, nonfriable
			198				
			199				
			200				

STATE PLANE COORDINATE: TOTAL DEPTH (FT): 230.00 GROUND ELEVATION (FT): 5554.40 PROJECT NUMBER: WAPP LOG OF BORING NUMBER: 69494  
 NORTH: 754163 AREA: NORTH BUFFER ZONE CASING DIAMETER (IN): 6.00 GEOLOGIST: J.C. WRIGHT  
 EAST: 2084768 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 09/26/94  
 REMARKS: HSA TO 20 FEET, AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 10/3/94. LOG FROM CUTTINGS ONLY.

CHEMICAL ANALYSIS DEPTH  
 GRADATIONAL SAMPLE DEPTH  
 SAMPLE NUMBER

SAMPLE SIZE  
 PERCENT RECOVERY  
 RECOVERY INTERVAL  
 DATUM (FT)  
 DEPTH (FT)  
 WELL OR PNEUMATIC CONSTRUCTION  
 LITHOLOGY  
 UNIFIED SOILS CLASSIFICATION OR ROCK TYPE  
 DESCRIPTION

200  
 201  
 202  
 203  
 204  
 205  
 206  
 207  
 208  
 209  
 210

200  
 201  
 202  
 203  
 204  
 205  
 206  
 207  
 208  
 209  
 210

SILTY CLAYSTONE: 200-210'  
 Silty claystone. Med. dark gray to dark gray (N4-103).  
 Argillaceous cement, slightly friable, dry.

STATE PLANE COORDINATE:

NORTH: 754163

EAST: 2084768

TOTAL DEPTH (FT): 230.00

AREA: NORTH BUFFER ZONE

LOCATOR NUMBER: 0

GROUND ELEVATION (FT): 5954.40

CASING DIAMETER (IN): 6.00

BOREHOLE DIAMETER (IN): 6.00

PROJECT NUMBER: WPP

GEOLOGIST: J.C. WRIGHT

DATE DRILLED: 09/26/94

LOG OF BORDING NUMBER:

69494

REMARKS: HSA TO 20 FEET, AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 10/3/94. LOG FROM CUTTINGS ONLY.

SAMPLE  
GRAIN  
SIZEPERCENT  
RECOVERYRECOVERY/  
INTERVALDATE (FT)  
DEPTH (FT)WELL OR  
PIEZOMETER  
CONSTRUCTION

LITHOLOGY

UNITED STATES  
CLASSIFICATION  
OR ROCK TYPE

DESCRIPTION

CLAYSTONE:

210-230'

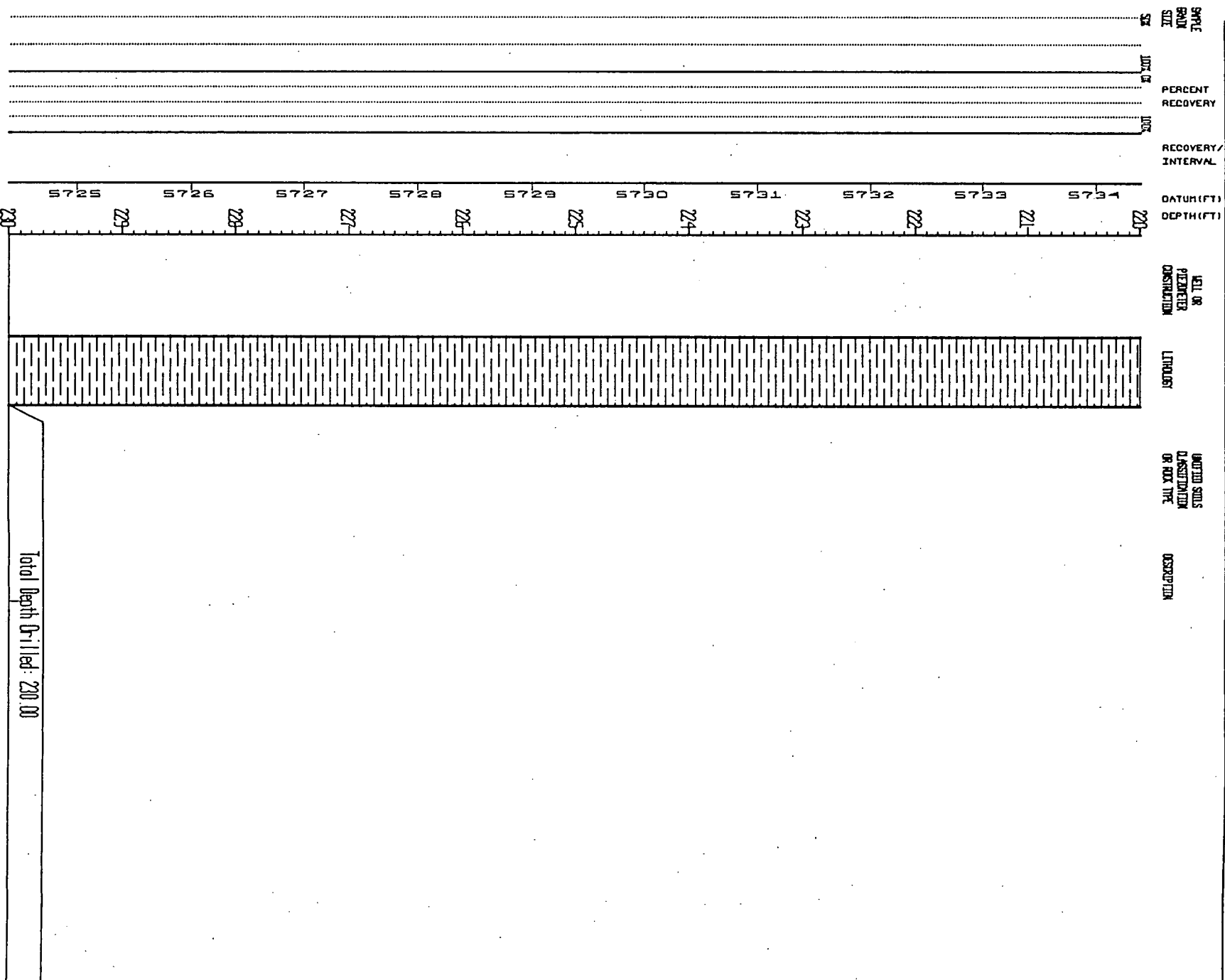
Claystone. Med. dark gray to dark gray (N4-N3).

Argillaceous cement, nonfriable, dry to slightly moist.

OPTIONAL SAMPLE DEPTH  
GRADATIONAL SAMPLE DEPTH  
SAMPLE NUMBER

SITE PLAC COORDINATE: TOTAL DEPTH (FT): 220.00 GROUND ELEVATION (FT): 5561.40 PROJECT NUMBER: 1489 LOG OF BORING NUMBER:  
NORTH: 75463 AREA: NORTH BUFFER ZONE CASING DIAMETER (IN): 6.00 GEOLOGIST: J.C. WRIGHT  
EAST: 287680 LOCATION NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE BORING: 09/25/94  
REMARKS: 15A TO 20 FEET, AIR ROTARY TO TD, J.C. WRIGHT, SP SPEC. BOREHOLE, APPROXIM 103/94. LOG FROM CUTTINGS ONLY.

69494



STATE PLANE COORDINATE: TOTAL DEPTH (FT): 170.00 GROUND ELEVATION (FT): 5958.10 PROJECT NUMBER: WAPP LOG OF BORING NUMBER: 69594  
 NORTH: 754111 AREA: NORTH BUFFER ZONE CASING DIAMETER (IN): 6.00 GEOLOGIST: J.C. WRIGHT  
 EAST: 2084531 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 09/23/94  
 REMARKS: HSA TO 20 FEET. AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/28/94. LOG FROM CUTTINGS ONLY.

CASE NO. BOREHOLE DEPTH  
 GRADATIONAL BOREHOLE DEPTH

SAMPLE NUMBER

SAMPLE GRAIN SIZE

100% OR

PERCENT RECOVERY

RECOVERY/INTERVAL

DATE (FT)

DEPTH (FT)

WELL OR PIEZOMETER CONSTRUCTION

LITHOLOGY

UNITED SOILS CLASSIFICATION OR ROCK TYPE

DESCRIPTION

NO RECOVERY: 0-4.5'  
 No recovery.

ML: 4.5-5.5'  
 Sandy clayey silt with some gravel. Grayish orange (10YR 7/4). Gravel up to approx. 1 inch, sub-round. Sand is dominantly m.g. to f.g., strongly calcareous - caliche. Mod. well graded, dry. No recovery (5.5-9.5').

SW: 9.5-10.5'  
 Gravelly sand with some silt and clay. Mod. yellowish brown (10YR 5/4). Gravel up to 1 inch, sub-round. Sand ranges from c.g. to f.g., mod. calcareous, moist. Well graded. No recovery (10.5-14.5').

69594

[illegible]



STATE PLANE COORDINATE: TOTAL DEPTH (FT): 170.00 GROUND ELEVATION (FT): 5958.10 PROJECT NUMBER: WPP LOG OF BORING NUMBER: 69594  
 NORTH: 754111 AREA: NORTH BUFFER ZONE CASING DIAMETER (IN): 6.00 GEOLOGIST: J.C. WRIGHT  
 EAST: 2084531 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 09/23/94  
 REMARKS: HSA TO 20 FEET. AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/28/94. LOG FROM CUTTINGS ONLY.

VERTICAL SAMPLE DEPTH  
 GRADATIONAL SAMPLE DEPTH  
 SAMPLE NUMBER

SAMPLE  
 GRAIN  
 SIZE

PERCENT  
 RECOVERY

RECOVERY/  
 INTERVAL

DATUM (FT)  
 DEPTH (FT)

WELL OR  
 PIEZOMETER  
 CONSTRUCTION

LITHOLOGY

UNIFIED SOILS  
 CLASSIFICATION  
 OR ROCK TYPE

DESCRIPTION

GR	SK	100%	LOG	DATE	DEPTH
				5958	20
				5957	21
				5956	22
				5955	23
				5954	24
				5953	25
				5952	26
				5951	27
				5950	28
				5949	29
				5948	30



CLAYSTONE:

20-40'

Claystone. Dark yellowish orange to pale yellowish brown (10YR 6/6 to 10YR 6/2). Argillaceous cement, nonfriable, moist. Depth of weathering is 40 ft.

REMARKS: HSA TO 20 FEET. AIR ROTARY TO TD. J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/28/94. LOG FROM CUTTINGS ONLY.

LOCATOR NUMBER: 0

BORE-HOLE DIAMETER (IN): 6.00

DATE DRILLED: 09/23/94

LOG OF BORDING NUMBER:

69594

SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/ INTERVAL	DATUM (FT) DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNITED STATES CLASSIFICATION OR ROCK TYPE	DESCRIPTION
50	100	100	5928				
			5927				
			5926				
			5925				
			5924				
			5923				
			5922				
			5921				
			5920				
			5919				

STATE PLANE COORDINATE: TOTAL DEPTH (FT): 170.00 GROUND ELEVATION (FT): 5958.10 PROJECT NUMBER: WRP LOG OF BORING NUMBER: 69594  
 NORTH: 75-111 AREA: NORTH BUFFER ZONE CASING DIAMETER (IN): 6.00 GEOLOGIST: J.C. WRIGHT  
 EAST: 208-531 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 09/23/94  
 REMARKS: HSA TO 20 FEET. AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/28/94. LOG FROM CUTTINGS ONLY.

CHRONOLOGICAL DEPTH  
 GRADATIONAL SAMPLE DEPTH  
 SAMPLE NUMBER

SAMPLE  
 GRAIN  
 SIZE

100% C

PERCENT  
 RECOVERY

100%

RECOVERY/  
 INTERVAL

DATE/FT  
 DEPTH(FT)

WELL OR  
 PIEZOMETER  
 CONSTRUCTION

LITHOLOGY

UNITED STATES  
 CLASSIFICATION  
 OR ROCK TYPE

DESCRIPTION

SILTY CLAYSTONE: 40-46'

Silty claystone. Med. dark gray (M). Argillaceous cement, slightly friable, dry.

SILTSTONE: 46-48'

Siltstone interbed.

SILTY CLAYSTONE: 48-80'

Silty claystone. Same description as 40-45'.

STATE PLANE COORDINATE: TOTAL DEPTH (FT): 170.00 GROUND ELEVATION (FT): 5558.10 PROJECT NUMBER: WRP LOG OF BORING NUMBER: 69594  
 NORTH: 754111 AREA: NORTH BUFFER ZONE CASING DIAMETER (IN): 6.00 GEOLOGIST: J.C. WRIGHT  
 EAST: 2034531 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 09/23/94  
 REMARKS: HSA TO 20 FEET. AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/28/94. LOG FROM CUTTINGS ONLY.

VERTICAL SAMPLE DEPTH GRADATIONAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY INTERVAL	DATUM (FT) DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNITED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
17		50x	100%	17	50				
					59b8				
					59b7				
					59b6				
					59b5				
					59b4				
					59b3				
					59b2				
					59b1				
					59b0				
					59a9				
					59				
					58				

**SAMPLE NUMBER**

6554

LOG OF BOARD NUMBER:

DLA

50504

**REMARKS:** 154 TO 20 FEET. AIR ROYAL TO TD, J.C. WRIGHT, SP. SEC. BOCHLE, ABANDONED 9/28/94. LOS FROM OUTLINES ONLY.

## DISCUSSION



STATE PLANE COORDINATE: TOTAL DEPTH (FT): 170.00 GROUND ELEVATION (FT): 5958.10 PROJECT NUMBER: WPP LOG OF BORING NUMBER: 69594  
 NORTH: 754111 AREA: NORTH BUFFER ZONE CASING DIAMETER (IN): 6.00 GEOLOGIST: J.C. WRIGHT  
 EAST: 2684531 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 09/23/94  
 REMARKS: HSA TO 20 FEET. AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/28/94. LOG FROM CUTTINGS ONLY.

CHIEF OF BORING DEPT  
 OPERATIONAL SAMPLE DEPTH  
 SAMPLE NUMBER

SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
50	100	100	SEB8	70				
			SEB7	71				
			SEB6	72				
			SEB5	73				
			SEB4	74				
			SEB3	75				
			SEB2	76				
			SEB1	77				
			SEB0	78				
			SEB9	79				
			SEB8	80				

STATE PLANE COORDINATE: TOTAL DEPTH (FT): 170.00 GROUND ELEVATION (FT): 5958.10 PROJECT NUMBER: WRP LOG OF BORING NUMBER: 69594  
 NORTH: 754111 AREA: NORTH BUFFER ZONE CASING DIAMETER (IN): 6.00 GEOLOGIST: J.C. WRIGHT  
 EAST: 2084531 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 09/23/94  
 REMARKS: 15A TO 20 FEET. AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/28/94. LOG FROM CUTTINGS ONLY.

WELL OR  
PIEZOMETER  
CONSTRUCTION

LITHOLOGIST

UNIFIED SOILS  
CLASSIFICATION  
OR ROCK TYPE

DESCRIPTION

RECOVERY/  
INTERVAL

PERCENT  
RECOVERY

100%  
100%

100%  
100%

DATE/DEPTH (FT)

80 81 82 83 84 85 86 87 88 89 90

CLAYSTONE:

80-120'  
 Claystone. Med. dark gray to grayish black (M4-M2).  
 Argillaceous cement, nonfriable, slightly moist to dry.  
 Very carbonaceous from 110-115'.





STATE PLANE COORDINATE:
TOTAL DEPTH (FT): 170.00
GROUND ELEVATION (FT): 558.10
PROJECT NUMBER: WAPP
LOG OF BORING NUMBER:

NORTH: 754111
AREA: NORTH BUFFER ZONE
CASING DIAMETER (IN): 6.00
GEOLOGIST: J.C. WRIGHT

EAST: 2084531
LOCATOR NUMBER: 0
BOREHOLE DIAMETER (IN): 6.00
DATE DRILLED: 09/23/94

REMARKS: HSA TO 20 FEET. AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/28/94. LOG FROM CUTTINGS ONLY.

69594

DEPTH (FT)	DATE/TIME	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNITED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
100					
101					
102					
103					
104					
105					
106					
107					
108					
109					
110					

LOG OF BORDING NUMBER:

J.C. WRIGHT

DATE ORILLED: 09/23/44

69594

**SAMPLE NUMBER**

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Category	Count	Percentage
1. 1st	11	11.11%
2. 2nd	11	11.11%
3. 3rd	11	11.11%
4. 4th	11	11.11%
5. 5th	11	11.11%
6. 6th	11	11.11%
7. 7th	11	11.11%
8. 8th	11	11.11%
9. 9th	11	11.11%
10. 10th	11	11.11%
11. 11th	11	11.11%
12. 12th	11	11.11%
13. 13th	11	11.11%
14. 14th	11	11.11%
15. 15th	11	11.11%
16. 16th	11	11.11%
17. 17th	11	11.11%
18. 18th	11	11.11%
19. 19th	11	11.11%
20. 20th	11	11.11%
21. 21st	11	11.11%
22. 22nd	11	11.11%
23. 23rd	11	11.11%
24. 24th	11	11.11%
25. 25th	11	11.11%
26. 26th	11	11.11%
27. 27th	11	11.11%
28. 28th	11	11.11%
29. 29th	11	11.11%
30. 30th	11	11.11%
31. 31st	11	11.11%
32. 32nd	11	11.11%
33. 33rd	11	11.11%
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48. 48th	11	11.11%
49. 49th	11	11.11%
50. 50th	11	11.11%
51. 51st	11	11.11%
52. 52nd	11	11.11%
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72. 72nd	11	11.11%
73. 73rd	11	11.11%
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80. 80th	11	11.11%
81. 81st	11	11.11%
82. 82nd	11	11.11%
83. 83rd	11	11.11%
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85. 85th	11	11.11%
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87. 87th	11	11.11%
88. 88th	11	11.11%
89. 89th	11	11.11%
90. 90th	11	11.11%
91. 91st	11	11.11%
92. 92nd	11	11.11%
93. 93rd	11	11.11%
94. 94th	11	11.11%
95. 95th	11	11.11%
96. 96th	11	11.11%
97. 97th	11	11.11%
98. 98th	11	11.11%
99. 99th	11	11.11%
100. 100th	11	11.11%

[illegible]

STATE PLANE COORDINATE: TOTAL DEPTH (FT): 170.00 GROUND ELEVATION (FT): 5958.10 PROJECT NUMBER: WAPP LOG OF BORING NUMBER: 69594  
 NORTH: 754111 HSEA: NORTH BUFFER ZONE CASING DIAMETER (IN): 6.00 GEOLOGIST: J.C. WRIGHT  
 EAST: 2084531 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 09/23/94  
 REMARKS: HSEA TO 20 FEET. AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/23/94. LOG FROM CUTTINGS ONLY.

WELL OR  
PIEZOMETER  
CONSTRUCTION

LITHOLOGY

UNIFIED SOILS  
CLASSIFICATION  
OR ROCK TYPE

DESCRIPTION

DEPTH (FT)

120

121

122

123

124

125

126

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170

SILTY CLAYSTONE: 120-170'

Silty claystone. Med. gray to med. dark gray (M5-M4).  
 Argillaceous cement, slightly friable, slightly moist to  
 dry.

STATE PLANE COORDINATE:

TOTAL DEPTH (FT): 170.00

GROUND ELEVATION (FT): 5958.10

PROJECT NUMBER: WRP

LOG OF BORING NUMBER:

NORTH: 754111

AREA: NORTH BUFFER ZONE

CASING DIAMETER (IN): 6.00

GEOLOGIST: J.C. WRIGHT

EAST: 2084531

LOCATOR NUMBER: 0

BOREHOLE DIAMETER (IN): 6.00

DATE DRILLED: 09/23/94

REMARKS: PSA TO 20 FEET. AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/28/94. LOG FROM CUTTINGS ONLY.

69594

SAMPLE  
GRAIN  
SIZEPERCENT  
RECOVERYRECOVERY/  
INTERVALDATUM (FT)  
DEPTH (FT)WELL OR  
PIEZOMETER  
CONSTRUCTION

LITHOLOGY

UNITED STATES  
CLASSIFICATION  
OR ROCK TYPE

DESCRIPTION

GR

SDR

100% GR

100%

SDR

130

SDR

131

SDR

132

SDR

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SDR

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SDR

135

SDR

136

SDR

137

SDR

138

SDR

139

SDR

140

STATE PLANE COORDINATE: TOTAL DEPTH (FT): 170.00 GROUND ELEVATION (FT): 5958.10 PROJECT NUMBER: WRP LOG OF BORING NUMBER: 69594  
 NORTH: 754111 AREA: NORTH BUFFER ZONE CASING DIAMETER (IN): 6.00 GEOLOGIST: J.C. WRIGHT  
 EAST: 2004501 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 09/23/94  
 REMARKS: HSA TO 20 FEET. AT: ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/28/94. LOG FROM CUTTINGS ONLY.

SECTION: 50001-17000  
 CHART: 10000-17000  
 SAMPLE NUMBER

SHAPE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/ INTERVAL	DATE (FT) DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
2	100		130				
50			141				
100			142				
100			143				
			144				
			145				
			146				
			147				
			148				
			149				
			150				

69594

69594

SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY INTERVAL	DATE (MFT) DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNITED STATES CLASSIFICATION OR ROCK TYPE	DESCRIPTION
50%	100%	100%	150				
			151				
			152				
			153				
			154				
			155				
			156				
			157				
			158				
			159				
			160				

STATE PLANE COORDINATE: TOTAL DEPTH (FT): 170.00 GROUND ELEVATION (FT): 5558.10 PROJECT NUMBER: WAPP LOG OF BOREHOLE NUMBER: 69594  
 NORTH: 754111 AREA: NORTH BUFFER ZONE CASING DIAMETER (IN): 6.00 GEOLOGIST: J.C. WRIGHT  
 EAST: 2081531 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 09/23/94  
 REMARKS: 154 TO 20 FEET. AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/28/94. LOG FROM CUTTINGS ONLY.

DEPTH (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNITED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
160	5750				
161	5751				
162	5752				
163	5753				
164	5754				
165	5755				
166	5756				
167	5757				
168	5758				
169	5759				
170	5760				

Total Depth Drilled: 170.00





69694

CHEMICAL SAMPLE DEPTH  
GRADUATIONAL SAMPLE DEPTH  
SAMPLE NUMBER

69694

**EXAMPLE NUMBER:**

PERCENT  
RECOVERY

RECOVERY/  
INTERVAL

DATE TIME (F7)

WELL OR  
PIEZOMETER  
CONSTRUCTION

## LITHOLOGY

UNIFIED SOILS  
CLASSIFICATION  
OR ROCK TYPE**DESCRIPTION**

NO RECOVERY: 215-240'  
No recovery. Last circulation.

CLAYSTONE: 20-35'  
Claystone. Dark yellowish orange to pale yellowish brown  
(LOT 6/6-LOT 6/2). Nonfriable, weathered (oxidized),  
moist. Weakly calcareous from 20-25'.

STATE PLANE COORDINATE: TOTAL DEPTH (FT): 230.00 GROUND ELEVATION (FT): 5951.20 PROJECT NUMBER: WRP LOG OF BORING NUMBER: 69694  
 NORTH: 754094 AREA: MONT BLUFF ZONE CASING DIAMETER (IN): 6.00 GEOLOGIST: J.C. WRIGHT  
 EAST: 2084989 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 09/27/94  
 REMARKS: HSA TO 20 FT. AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/29/94. LOG FROM CUTTINGS ONLY.

SECTION - SAMPLE DEPTH  
 GRADATIONAL B  
 DEPTH

SAMPLE NUMBER

SAMPLE  
GRAIN  
SIZE

PERCENT  
RECOVERY

RECOVERY/  
INTERVAL

DATUR(FT)  
DEPTH(FT)

WELL OR  
PIEZOMETER  
CONSTRUCTION

LITHOLOGY

UNIFIED SOILS  
CLASSIFICATION  
OR ROCK TYPE

DESCRIPTION

OK

OK

100% OK

100%

5921

30

5920

31

5919

32

5918

33

5917

34

5916

35

5915

36

5914

37

5913

38

5912

39

40

SILTY CLAYSTONE: 35-45'

Silty claystone. Pale yellow brown (10YR 6/2) from 35-40'. Dark gray (N2) from 40-45'. Argillaceous cement, slightly friable, moist. Bottom of oxidized zone is 40ft.

REMARKS: HSA TO 20 FT. AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/29/94.

LOCATOR NUMBER: 0

BOREHOLE DIAMETER (IN): 6.00

DATE ORILED: 09/27/94

LOG OF BORDING NUMBER:

69694

LOG FROM CUTTINGS ONLY.

**DESCRIPTION**

CHEMICAL SAMPLE DEPTH  
GRADATIONAL SAMPLE DEPTH  
SAMPLE NUMBER

[illegible]

CLAYSTONE:

5-130'

Claystone. Color ranges from med. gray (N5), to grayish black (N2). Argillaceous cement, nonfriable. Generally slightly moist, however wet intervals are noted as 95-100', 110', and 125-130'. Carbonaceous intervals at 55-60', 90-100', and 110-115'. Slight increase in silt content from 120-130'. Probably due to thin interbeds of silty claystone.

STATE PLANE COORDINATE: TOTAL DEPTH (FT): 230.00 GROUND ELEVATION (FT): 551.20 PROJECT NUMBER: WRP LOG OF BORING NUMBER: 69694  
 NORTH: 754094 AREA: MONT BUFFER ZONE CASING DIAMETER (IN): 6.00 GEOLOGIST: J.C. WRIGHT  
 EAST: 2084989 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 09/27/94  
 REMARKS: HSA TO 20 FT. AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/29/94. LOG FROM CUTTINGS ONLY.

WELL OR  
PIEZOMETER  
CONSTRUCTION

LITHOLOGY

UNIFIED SOILS  
CLASSIFICATION  
OR ROCK TYPE

DESCRIPTION

DATE OF  
SAMPLE  
SIZE

PERCENT  
RECOVERY

RECOVERY/  
INTERVAL

DATE (FT)  
DEPTH (FT)

50

51

52

53

54

55

56

57

58

59

60

50

51

52

53

54

55

56

57

58

59

60

LOG OF BORDING NUMBER:

J.C. WRIGHT

DATE ORILLED: 09/27/94

69694

## DESCRIPTION

[illegible]

EAST: 2084989

AREA: MORIT BUFFER ZONE

LOCATOR NUMBER: 0

GROUND ELEVATION (FT): 5951.20

CASING DIAMETER (IN): 6.00

BORE-HOLE DIAMETER (IN): 6.00

PROJECT NUMBER: UNDP

REF ID: A67051

DATE ORIELLED: 09/27/94

LOG OF BORING NUMBER:

69694

REMARKS: 15A TO 20 FT. AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/29/94. LOG FROM CUTTINGS ONLY.

SNIPLE  
BRADN  
SIZE

58

100X OK

100X OK

PERCENT  
RECOVERY

3

RECOVERY /  
INTERVAL

DATE TIME (FT)

2

### WELL OR PIEZOMETER CONSTRUCTION

LITHOLOGY

UNIFIED SOILS  
CLASSIFICATION  
OR ROCK TYPE

### DESCRIPTION

DATE	DESCRIPTION	AMOUNT	BALANCE
5072			5080
5073		5075	5079
5074		5076	5078
5075		5077	5077
5076		5078	5076
5077		5079	5075
5078		5080	5074
5079		5081	5073
5080		5082	5072
5081		5083	5071
5082		5084	5070
5083		5085	5069
5084		5086	5068
5085		5087	5067
5086		5088	5066
5087		5089	5065
5088		5090	5064
5089		5091	5063
5090		5092	5062
5091		5093	5061
5092		5094	5060
5093		5095	5059
5094		5096	5058
5095		5097	5057
5096		5098	5056
5097		5099	5055
5098		5100	5054
5099		5101	5053
5100		5102	5052
5101		5103	5051
5102		5104	5050
5103		5105	5049
5104		5106	5048
5105		5107	5047
5106		5108	5046
5107		5109	5045
5108		5110	5044
5109		5111	5043
5110		5112	5042
5111		5113	5041
5112		5114	5040
5113		5115	5039
5114		5116	5038
5115		5117	5037
5116		5118	5036
5117		5119	5035
5118		5120	5034
5119		5121	5033
5120		5122	5032
5121		5123	5031
5122		5124	5030
5123		5125	5029
5124		5126	5028
5125		5127	5027
5126		5128	5026
5127		5129	5025
5128		5130	5024
5129		5131	5023
5130		5132	5022
5131		5133	5021
5132		5134	5020
5133		5135	5019
5134		5136	5018
5135		5137	5017
5136		5138	5016
5137		5139	5015
5138		5140	5014
5139		5141	5013
5140		5142	5012
5141		5143	5011
5142		5144	5010
5143		5145	5009
5144		5146	5008
5145		5147	5007
5146		5148	5006
5147		5149	5005
5148		5150	5004
5149		5151	5003
5150		5152	5002
5151		5153	5001
5152		5154	5000
5153		5155	4999
5154		5156	4998
5155		5157	4997
5156		5158	4996
5157		5159	4995
5158		5160	4994
5159		5161	4993
5160		5162	4992
5161		5163	4991
5162		5164	4990
5163		5165	4989
5164		5166	4988
5165		5167	4987
5166		5168	4986
5167		5169	4985
5168			

7  
7  
7  
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7  
7  
7

8

STATE PLANE COORDINATE: NORTH: 754094 EAST: 2084989 TOTAL DEPTH (FT): 230.00 AREA: NORTH BUFFER ZONE LOCATOR NUMBER: 0 GROUND ELEVATION (FT): 5551.20 CASING DIAMETER (IN): 6.00 BOREHOLE DIAMETER (IN): 6.00 PROJECT NUMBER: WRP GEOLOGIST: J.C. WRIGHT DATE DRILLED: 09/27/94 LOG OF BORING NUMBER: 69694

REMARKS: HSA TO 20 FT. AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/29/94. LOG FROM CUTTINGS ONLY.

CHEMICAL SAMPLE DEPTH  
GRADATIONAL SAMPLE DEPTH  
SAMPLE NUMBER

SAMPLE GRAIN SIZE		PERCENT RECOVERY	RECOVERY/INTERVAL	DATE (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNITED STATES CLASSIFICATION OR ROCK TYPE	DESCRIPTION
50	100	100		5671	80		[Hatched Pattern]		
				5670	81				
				5669	82				
				5668	83				
				5667	84				
				5666	85				
				5665	86				
				5664	87				
				5663	88				
				5662	89				
					90				



STATE PLANE COORDINATE: TOTAL DEPTH (FT): 230.00 GROUND ELEVATION (FT): 5551.20 PROJECT NUMBER: WPP LOG OF BORING NUMBER:  
 NORTH: 754094 AREA: MONT BUFFER ZONE CASING DIAMETER (IN): 6.00 GEOLOGIST: J.C. WRIGHT  
 EAST: 2084989 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 09/27/94  
 REMARKS: HSA TO 20 FT. AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/29/94. LOG FROM CUTTINGS ONLY.

69694

CHEMICAL SAMPLE DEPTH  
 GRADATIONAL SAMPLE DEPTH  
 SAMPLE NUMBER

SAMPLE  
 GRAIN  
 SIZE

PERCENT  
 RECOVERY

RECOVERY/  
 INTERVAL

DATUM(FT)  
 DEPTH(FT)

WELL OR  
 PIEZOMETER  
 CONSTRUCTION

LITHOLOGY

UNITED SOILS  
 CLASSIFICATION  
 OR ROCK TYPE

DESCRIPTION

90  
 91  
 92  
 93  
 94  
 95  
 96  
 97  
 98  
 99  
 100

5851 5852 5853 5854 5855 5856 5857 5858 5859 5860 5861



STATE PLANE COORDINATE: TOTAL DEPTH (FT): 230.00 GROUND ELEVATION (FT): 5551.20 PROJECT NUMBER: WRP LOG OF BORING NUMBER: 69694  
 NORTH: 754094 AREA: NORTH BUFFER ZONE CASING DIAMETER (IN): 6.00 GEOLOGIST: J.C. WRIGHT  
 EAST: 2084989 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 09/27/94  
 REMARKS: 16A TO 20 FT. AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/29/94. LOG FROM CUTTINGS ONLY.

CHEMICAL SAMPLE DEPTH GRADATIONAL SAMPLE DEPTH		SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY INTERVAL	DATE (FT) DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
						100				
						99				
						98				
						97				
						96				
						95				
						94				
						93				
						92				
						91				
						90				
						89				
						88				
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						17				
						16				
						15				
						14				
						13				
						12				
						11				
						10				
						9				
						8				
						7				
						6				
						5				
						4				
						3				
						2				
						1				
						0				

LOG OF BORING NUMBER:

J C WRIGHT

DATE DRILLED: 09/27/94

REMARKS: HSA TO 20 FT. AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/29/94. LOG FROM CUTTINGS ONLY.

69694

**SAMPLE NUMBER**

**DISCUSSION**

[illegible]

5032	5033	5034	5035	5036	5037	5038	5039	5040	5041
5032	5033	5034	5035	5036	5037	5038	5039	5040	5041

69694

WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNITED STATES CLASSIFICATION OR ROCK TYPE	DESCRIPTION	DATE (FT)	DEPTH (FT)	RECOVERY/ INTERVAL	PERCENT RECOVERY	SAMPLE GRAIN SIZE
					120			
					121			
					122			
					123			
					124			
					125			
					126			
					127			
					128			
					129			
					130			

STATE PLANE COORDINATE: TOTAL DEPTH (FT): 230.00 GROUND ELEVATION (FT): 5551.20 PROJECT NUMBER: WAPP LOG OF BORING NUMBER: 69694  
 NORTH: 754094 AREA: NORTH BUFFER ZONE CASTING DIAMETER (IN): 6.00 GEOLOGIST: J.C. WRIGHT  
 EAST: 2084989 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 09/27/94  
 REMARKS: HSA TO 20 FT. AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/29/94. LOG FROM CUTTINGS ONLY.

CHEMICAL SAMPLE DEPTH  
 GRADATIONAL SAMPLE DEPTH  
 SAMPLE NUMBER

SAMPLE GRAIN SIZE PERCENT RECOVERY RECOVERY/ INTERVAL DATUM (FT) DEPTH (FT) WELL OR PIEZOMETER CONSTRUCTION LITHOLOGY UNIFIED SOILS CLASSIFICATION OR ROCK TYPE DESCRIPTION

SILTY CLAYSTONE: 130-135'  
 Silty claystone. Med. dark gray (M4). Argillaceous cement, slightly friable, slightly moist.

CLAYSTONE: 135-150'  
 Claystone. Med. dark gray (M4). Argillaceous cement, nonfriable, moist to wet.

STATE PLANE COORDINATE: TOTAL DEPTH (FT): 230.00 GROUND ELEVATION (FT): 5551.20 PROJECT NUMBER: WWP LOG OF BORING NUMBER: 69694  
 NORTH: 754094 AREA: MORTU BUFFER ZONE CASING DIAMETER (IN): 6.00 GEOLOGIST: J.C. WRIGHT  
 EAST: 2084989 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 09/27/94  
 REMARKS: H&A TO 20 FT. AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/29/94. LOG FROM CUTTINGS ONLY.

DATE	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNSATURATED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	5X	10X	100X		140				
				sub 1	141				
				sub 10	142				
				sub 12	143				
				sub 13	144				
				sub 14	145				
				sub 15	146				
				sub 16	147				
				sub 17	148				
				sub 18	149				
				sub 19	150				

REMARKS: HSA TO 20 FT. AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/29/94. LOG FROM CUTTINGS ONLY.

LOCATOR NUMBER: 0

BOREHOLE DIAMETER (IN): . 6.00

DATE ORILED: 09/27/94

LOG OF BOARDING NUMBER:

69694

SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/ INTERVAL
-------------------------	---------------------	-----------------------

DATUM (FT)

### WELL OR PIEZOMETER CONSTRUCTION

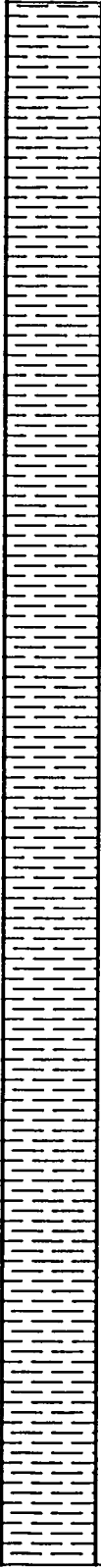
## LITHOLOGY

UNOFTEN SOILS  
CLASSIFICATION  
OR ROCK TYPE**DESCRIPTION**

SILTY CLAYSTONE: 150-160'

Silty claystone. Med. dark gray (M4). Argillaceous cement, slightly friable, moist to 155', 155-160' wet and poor recovery.

69694

SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/ INTERVAL	DATUM(FT) DEPTH(FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
5/16	100% OR	100%	5791 160			CLAYSTONE:	160-170'
			5790 161			Claystone. Med. dark gray (M). Argillaceous cement, nonfriable, moist.	
			5789 162				
			5788 163				
			5787 164				
			5786 165				
			5785 166				
			5784 167				
			5783 168				
			5782 169				
			170				



STATE PLANE COORDINATE: TOTAL DEPTH (FT): 230.00 GROUND ELEVATION (FT): 5551.20 PROJECT NUMBER: WAPP LOG OF BORING NUMBER: 69694  
 NORTH: 75494 AREA: NORTH BUFFER ZONE CASING DIAMETER (IN): 6.00 GEOLOGIST: J.C. WRIGHT  
 EAST: 2084989 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 09/27/94  
 REMARKS: HSA TO 20 FT. AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/29/94. LOG FROM CUTTINGS ONLY.

VERTICAL SAMPLE DEPTH  
 GRAVITATIONAL SAMPLE DEPTH  
 SAMPLE NUMBER

SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/ INTERVAL	DATE (FT) DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNITED STATES CLASSIFICATION OR ROCK TYPE	DESCRIPTION
50	100	100	170				NO RECOVERY: 170-175' No recovery. Lost circulation. Wet.
50	100	100	171				
50	100	100	172				
50	100	100	173				
50	100	100	174				
50	100	100	175				CLAYSTONE: 175-185' Claystone. Dark gray (M3). Argillaceous cement, nonfriable. Very moist.
50	100	100	176				
50	100	100	177				
50	100	100	178				
50	100	100	179				
50	100	100	180				

EAST: 2084989

AREA: MORIT BUFFER ZONE

LOCATOR NUMBER: 0

GROUND ELEVATION (FT): 5951.20

CASING DIAMETER (IN): 6.00

BORE-HOLE DIAMETER (IN): 6.00

PROJECT NUMBER: WADD 1107

GEOLOGIST: J. C. WRIGHT

DATE ORILED: 09/27/94

LOG OF BORING NUMBER:

69694

REMARKS: 15A TO 20 FT. AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/29/94. LOG FROM CUTTINGS ONLY.

SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY INTERVAL	DATE (FT) DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNITED STATES CLASSIFICATION OR ROCK TYPE	DESCRIPTION
50	100	100	5771 180				
			5770 181				
			5769 182				
			5768 183				
			5767 184				
			5766 185				
			5765 186				
			5764 187				
			5763 188				
			5762 189				
						NO RECOVERY:	185-210' No recovery and conditions approximately ft.

STATE PLANE COORDINATE: TOTAL DEPTH (FT): 230.00 GROUND ELEVATION (FT): 5551.20 PROJECT NUMBER: WRP LOG OF BORING NUMBER: 69694  
 NORTH: 754094 AREA: NORTH BUFFER ZONE CASING DIAMETER (IN): 6.00 GEOLOGIST: J.C. WRIGHT  
 EAST: 2384989 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 09/27/94  
 REMARKS: HSA TO 20 FT. AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/29/94. LOG FROM CUTTINGS ONLY.

WELL OR  
PIEZOMETER  
CONSTRUCTION

LITHOLOGY

UNSATURATED SOILS  
CLASSIFICATION  
OR ROCK TYPE

DESCRIPTION

DATE OF  
SAMPLE  
SIZE

PERCENT  
RECOVERY

RECOVERY/  
INTERVAL

DATE OF  
DEPTH (FT)

190

191

192

193

194

195

196

197

198

199

200

# STATE PLANE COORDINATE:

NORTH: 75494

EAST: 284989

REMARKS: USA TO 20 FT. AIR MOUNT TO IN, J.C. MOUNT, SEP 95C. BOREHOLE, APPROX 9/29/94. LOG FROM CUTTINGS ONLY.

TOTAL DEPTH (FT): 20.00

AREA MOUNT BUFFER ZONE

LOCATION NUMBER: 0

GROUND ELEVATION (FT): 5551.20

CASING DIAMETER (IN): 6.00

BOREHOLE DIAMETER (IN): 6.00

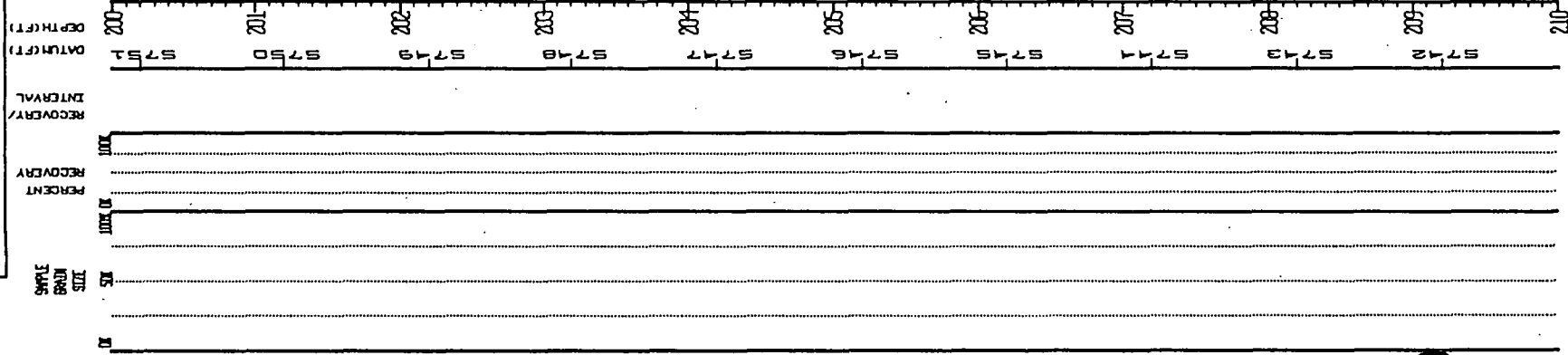
PROJECT NUMBER:

J.C. MOUNT

DATE DRILLED: 09/27/94

LOG OF BOREHOLE NUMBER:

69694



WELL OR  
PIEZOMETER  
CONSTRUCTION

LITHOLOGY

UNITED STATES  
CLASSIFICATION  
OR ROCK TYPE

DESCRIPTION



STATE PLANE COORDINATE: TOTAL DEPTH (FT): 230.00 GROUND ELEVATION (FT): 5551.20 PROJECT NUMBER: WWP LOG OF BORING NUMBER: 69694  
 NORTH: 754094 AREA: MONT. BUFFER ZONE CASING DIAMETER (IN): 6.00 GEOLOGIST: J.C. WRIGHT  
 EAST: 2084989 LOCATOR NUMBER: 0 BOREHOLE DIAMETER (IN): 6.00 DATE DRILLED: 09/27/94  
 REMARKS: HSA TO 20 FT. AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/29/94. LOG FROM CUTTINGS ONLY.

DEPTH (FT) DATA (FT) WELL OR PIEZOMETER CONSTRUCTION LITHOLOGY UNIFIED SOILS CLASSIFICATION OR ROCK TYPE DESCRIPTION

DEPTH (FT) DATA (FT) WELL OR PIEZOMETER CONSTRUCTION LITHOLOGY UNIFIED SOILS CLASSIFICATION OR ROCK TYPE DESCRIPTION

CLAYSTONE:

210-215'  
 Claystone. Dark gray (M3). Argillaceous cement, nonfriable, dry.

NO RECOVERY: 215-230'  
 No recovery. Lost circulation.

STATE PLANE COORDINATE: NORTH: 754094 EAST: 2084989 TOTAL DEPTH (FT): 230.00 AREA: NORTH BUFFER ZONE LOCATOR NUMBER: 0 GROUND ELEVATION (FT): 5551.20 CASING DIAMETER (IN): 6.00 BOREHOLE DIAMETER (IN): 6.00 PROJECT NUMBER: WAPP GEOLOGIST: J.C. WRIGHT DATE DRILLED: 09/27/94 LOG OF BORING NUMBER: 69694

REMARKS: HSA TO 20 FT. AIR ROTARY TO TD, J.C. WRIGHT, SEP SPEC. BOREHOLE, ABANDONED 9/29/94. LOG FROM CUTTINGS ONLY.

DEPTH (FT) 230  
 DATUM (FT) 220  
 WELL OR PIEZOMETER CONSTRUCTION  
 LITHOLOGY  
 UNIFIED SOILS CLASSIFICATION OR ROCK TYPE  
 DESCRIPTION

DEPTH (FT) 230  
 DATUM (FT) 220  
 WELL OR PIEZOMETER CONSTRUCTION  
 LITHOLOGY  
 UNIFIED SOILS CLASSIFICATION OR ROCK TYPE  
 DESCRIPTION

Total Depth Drilled: 230.00

## APPENDIX C

# GEOPHYSICAL LOGS

### Borehole Number

1.	5074	17.	6674
2.	5174	18.	6774
3.	5274	19.	5887
4.	5374	20.	7287
5.	5474	21.	B302989
6.	5574	22.	31791
7.	5674	23.	35691
8.	5774	24.	24193
9.	5874	25.	24393
10.	5974	26.	69194
11.	6074	27.	69294
12.	6174	28.	69394
13.	6274	29.	69494
14.	6374	30.	69594
15.	6474	31.	69694
16.	6574		

PREPARED BY MERRICK & COMPANY  
 FOR: JACOBS ENGINEERING GROUP  
 DATE: September 14, 1994  
 REVISED: November 7, 1994

MERRICK & CO. JOB #  
 155-1244

MONITOR WELL LOCATIONS FOR  
 WELL ABANDONMENT AND REPLACEMENT PROGRAM AT ROCKY FLATS PLANT

TRUE STATE PLANE COORDINATES (Colo North Zone, NAD 27)					
WELL PTS	NORTH	EAST	ELEV	DESCRIPTION	==
154	750987.145	2084443.6387	5977.57	TOP ALUM CAP IN CONC	
154			5976.98	GROUND N SIDE CONC PAD	
166	748963.4303	2080546.8844	6056.1	TOP ALUM CAP IN CONC	
188	750799.5704	2083296.315	5955.27	TOP ALUM CAP/SURFACE ELEV	
254	750053.0457	2084736.1799	5968.38	TOP ALUM CAP IN CONC	
254			5967.94	GROUND N SIDE CONC PAD	
288	750537.6706	2083057.9931	5970.15	TOP ALUM CAP/SURFACE ELEV	
308-P1	751968.2353	2084165.0251	5944.52	TOP STEEL CASING	
308-P1			5944.11	TOP PVC	
308-P1			5942.07	GROUND N SIDE ON ASP	
308-P2	752051.7982	2084580.2346	5944.37	TOP STEEL CASING	
308-P2			5944.02	TOP PVC	
308-P2			5941.97	GROUND N SIDE ON ASP	
354	750052.466	2084755.0205	5967.55	TOP ALUM CAP IN CONC	
354			5967.11	GROUND N SIDE CONC PAD	
388	750129.5509	2083614.4052	5991.08	TOP ALUM CAP/SURFACE ELEV	
391	748886.6365	2086805.4096	5922.96	TOP STEEL CASING	
391			5922.73	TOP PVC	
391			5920.72	GROUND N SIDE OF CONC PAD	
488	749853.3994	2083366.5846	5998.22	TOP ALUM CAP/SURFACE ELEV	
588	749602.0398	2083892.7448	5987.32	TOP ALUM CAP/SURFACE ELEV	
688	749633.1291	2084483.6137	5977.13	TOP ALUM CAP/SURFACE ELEV	
888	748968.2219	2082154.4943	6025.94	TOP BRASS CAP/SURFACE ELEV	
988	749071.3586	2083054.415	6009.67	TOP ALUM CAP/SURFACE ELEV	
1188	748612.8046	2083682.9037	6004.58	TOP ALUM CAP IN CONC	
1188			6004.08	GROUND N SIDE OF CONC PAD	
5070	751027.5398	2084211.4546	5962.55	TOP ALUM CAP IN CONC	
5070			5962.55	GROUND N SIDE OF CONC PAD	
5071	749030.6928	2081911.4023	6028.8	TOP ALUM CAP/SURFACE ELEV	
5074	751066.0469	2084732.086	5965.63	TOP PVC	
5074			5963.19	GROUND N SIDE OF PIPE	
5170	750621.3597	2083826.3195	5986.39	TOP ALUM CAP/SURFACE ELEV	
5171	750130.7373	2084020.8614	5987.13	TOP ALUM CAP/SURFACE ELEV	
5174	751069.1206	2084933.1343	5960.05	TOP PVC	
5174			5958.31	GROUND N SIDE OF PIPE	
5270	750631.3112	2083843.1063	5986.19	TOP ALUM CAP/SURFACE ELEV	
5271	751020.9792	2084168.4568	5966	TOP ALUM CAP IN CONC	
5271			5965.56	GROUND N SIDE OF CONC PAD	
5274	751098.8667	2085104.331	5953.87	TOP PVC	
5274			5952.93	GROUND N SIDE OF PIPE	
5374	750581.0612	2086324.8221	5955.99	TOP PVC	
5374			5953.05	GROUND N SIDE OF PIPE	
5474	751073.8078	2086320.3406	5936.81	TOP PVC	
5474			5933.22	GROUND N SIDE OF PIPE	
5570	749656.1438	2084884.786	5974.71	TOP ALUM CAP IN CONC	
5570			5974.17	GROUND N SIDE OF CONC PAD	
5574	751176.4784	2087078.0932	5954.07	TOP PVC	
5574			5952.33	GROUND N SIDE OF PIPE	
5670	750712.338	2083670.0192	5985.9	TOP ALUM CAP IN CONC	



5670			5985.4	GROUND N SIDE OF CONC PAD
5671	749145.6906	2081525.6346	6037.19	TOP ALUM CAP IN CONC
5674	750989.2611	2086416.5345	5956.38	TOP PVC
5674			5955.4	GROUND N SIDE OF PIPE
5771	750542.7954	2084421.1915	5978.5	TOP ALUM CAP IN CONC
5771			5978	GROUND N SIDE OF PIPE
5774	750821.9845	2086074.9884	5956.04	GROUND N SIDE/BROKEN PVC
5871	750654.909	2084386.234	5978.86	TOP ALUM CAP
5871			5978.36	GROUND N SIDE OF PIPE
5874	751567.6757	2085830.0189	5884.06	TOP PVC
5874			5880.91	GROUND N SIDE OF PIPE
5971	749204.526	2084124.0361	5992.71	TOP ALUM CAP IN CONC
5971			5992.61	GROUND N SIDE OF CONC PAD
5974	751815.1177	2085580.076	5858.82	TOP PVC
5974			5856.87	GROUND N SIDE OF PIPE
6071	749029.6827	2084050.5	5992.94	TOP ALUM CAP/SURFACE ELEV
6074	752106.3352	2085775.2437	5888.84	TOP PVC
6074			5886.79	GROUND N SIDE OF PIPE
6174	752078.7183	2085308.4981	5916.92	TOP PVC
6174			5914.77	GROUND N SIDE OF PIPE
6271	749118.0971	2083775.0032	6000.94	TOP ALUM CAP/SURFACE ELEV
6274	751738.1021	2085154.4156	5874.33	TOP PVC
6274			5871.23	GROUND N SIDE OF PIPE
6374	751806.1444	2084589.4732	5909.55	TOP PVC
6374			5907.55	GROUND N SIDE OF PIPE
6474	752233.6517	2084693.7604	5963.2	TOP PVC
6474			5961.15	GROUND N SIDE OF PIPE
6574	752247.0517	2084274.1648	5969.61	TOP PVC
6574			5967.56	GROUND N SIDE OF PIPE
6674	752088.9898	2083791.6915	5977.92	TOP PVC
6674			5974.67	GROUND N SIDE OF PIPE
6774	750979.9831	2080102.8783	6050.14	TOP PVC
6774			6048.23	GROUND N SIDE OF PIPE
6874	752226.8808	2080249.4665	6035.24	TOP ALUM CAP IN CONC
6874			6035.03	GROUND N SIDE OF PIPE
10094	743067.0355	2091932.1714	5666.73	TOP STEEL CASING
10094			5665.92	TOP PVC
10094			5663.68	GROUND N SIDE CONC PAD
10194	749121.3809	2088283.8403	5940.88	TOP STEEL CASING
10194			5940.38	TOP PVC
10194			5938.28	GROUND N SIDE OF PIPE
10294	742318.8907	2093691.1812	5626.13	TOP STEEL CASING
10294			5625.93	TOP PVC
10294			5623.78	GROUND N SIDE CONC PAD
10394	744946.9266	2093663.7237	5653.5	TOP STEEL CASING
10394			5653.13	TOP PVC
10394			5650.35	GROUND N SIDE CONC PAD
10494	753887.8498	2088535.7442	5759.77	TOP ALUM CAP IN CONC PAD
10494			5759.57	GROUND N SIDE OF CONC PAD
10594	752124.3077	2086746.4964	5821.35	TOP STEEL CASING
10594			5820.95	TOP PVC
10594			5818.02	GROUND N SIDE OF PIPE
10694	752659.0465	2088757.1326	5760.67	TOP STEEL CASING
10694			5760.23	TOP PVC
10694			5757.29	GROUND N SIDE CONC PAD
10794	753735.3855	2090859.9562	5699.27	TOP STEEL CASING
10794			5698.51	TOP PVC
10794			5695.85	GROUND N SIDE CONC PAD
10894	753948.1745	2092348.3047	5670.07	TOP STEEL CASING
10894			5668.91	TOP PVC
10894			5666.75	GROUND N SIDE CONC PAD

10994	747431.1697	2083265.9363	5917.96	TOP STEEL CASING
10994			5917.48	TOP PVC
10994			5915.41	GROUND N SIDE CONC PAD
11094	747259.9318	2082927.3788	5912.37	TOP STEEL CASING
11094			5912.03	TOP PVC
11094			5909.87	GROUND N SIDE CONC PAD
11194	743082.357	2091944.3053	5665.65	TOP ALUM CAP/SURFACE ELEV
11294	749435.1554	2074304.9595	6174.24	TOP STEEL CASING
11294			6173.5	TOP PVC
11294			6171.4	GROUND N SIDE OF CONC PAD
11394	747847.4994	2076297.0311	6147.01	TOP STEEL CASING
11394			6146.46	TOP PVC
11394			6144.26	GROUND N SIDE OF CONC PAD
11494	748147.5817	2074267.0095	6186.93	TOP STEEL CASING
11494			6186.63	TOP PVC
11494			6184.58	GROUND N SIDE OF CONC PAD
11594	751604.4391	2075705.8886	6116.33	TOP STEEL CASING
11594			6115.58	TOP PVC
11594			6113.58	GROUND N SIDE OF CONC PAD
11694	755770.4526	2085007.6513	5948.16	TOP STEEL CASING
11694			5947.66	TOP PVC
11694			5945.21	GROUND N SIDE OF CONC PAD
11791	748900.4561	2086786.0134	5925.34	TOP STEEL CASING
11791			5925.12	TOP PVC
11791			5923.1	GROUND N SIDE OF CONC PAD
11794	755760.4279	2085006.7242	5948.54	TOP STEEL CASING
11794			5948.06	TOP PVC
11794			5945.49	GROUND N SIDE OF CONC PAD
11894	752859.9516	2095268.4689	5616.06	TOP STEEL CASING
11894			5615.35	TOP PVC
11894			5613.11	GROUND N SIDE CONC PAD
11994	753276.2911	2094758.5749	5627.98	TOP STEEL CASING
11994			5627.54	TOP PVC
11994			5625.28	GROUND N SIDE CONC PAD
12094	753879.8565	2088529.2241	5763.54	TOP STEEL CASING
12094			5763.07	TOP PVC
12094			5759.99	GROUND N SIDE CONC PAD
24193	749806.6393	2086904.5147	5956.52	TOP 3/4" ALUM CAP/SURFACE
24393	749788.0587	2086907.5097	5957.07	TOP 3/4" ALUM CAP/SURFACE
24993	749808.8299	2086909.4468	5956.31	TOP 3/4" ALUM CAP/SURFACE
25093	749787.1595	2086912.4658	5957.19	TOP 3/4" ALUM CAP/SURFACE
31791	747424.6026	2084276.2985	5879.91	TOP STEEL CASING
31791			5879.31	TOP PVC
31791			5877.16	GROUND N SIDE CONC PAD
35691	747794.4729	2084005.9546	5941.48	TOP STEEL CASING
35691			5941.08	TOP PVC
35691			5938.53	GROUND N SIDE CONC PAD
42893	750611.4528	2084451.5935	5980.35	TOP STEEL CASING
42893			5978.05	GROUND N SIDE OF PIPE
44592	752489.1401	2083142.1438	6010.49	EXTREME TOP 90° PVC VENT
44592			6005.24	TOP STEEL CASING
44592			5995.19	CURRENT G ELEV ON MOUND
45091	757431.3753	2076975.8731	6035.39	TOP ALUM CAP IN CONC
45091			6035.18	GROUND N SIDE OF CONC PAD
45191	757406.9002	2076503.1723	6042.97	TOP ALUM CAP IN CONC
45191			6042.76	GROUND N SIDE OF CONC PAD
45291	757760.0628	2076728.7685	6037.23	TOP ALUM CAP IN CONC
45291			6037.02	GROUND N SIDE OF CONC PAD
52194	749374.5066	2084792.9567	5978.66	TOP ALUM CAP/FLUSH IN ASP
52294	749008.3103	2084904.1819	5982.32	TOP ALUM CAP IN CONC
52294			5981.87	ASP N SIDE OF CONC

52394	748670.615	2084769.1454	5987.55	TOP ALUM CAP IN CONC
52394			5987.75	GROUND N SIDE (GRAVEL)
60194	748852.7659	2086847.822	5917.52	TOP 1 1/2" PVC
60194			5916.18	GROUND N SIDE OF PIPE
60294	748913.7678	2086858.7917	5921.83	TOP PVC
60294			5920.79	GROUND N SIDE OF PIPE
60394	748891.7777	2086746.3604	5925.18	TOP PVC
60394			5924.24	GROUND N SIDE OF PIPE
60494	748894.1174	2086747.8392	5925.5	TOP PVC
60494			5924.46	GROUND N SIDE OF PIPE
60594	748895.5292	2086748.6569	5925.56	TOP PVC
60594			5924.52	GROUND N SIDE OF PIPE
60694	748904.9611	2086678.9252	5931.67	TOP PVC
60694			5930.63	GROUND N SIDE OF PIPE
60794	748904.7675	2086677.4376	5931.87	TOP PVC
60794			5930.83	GROUND N SIDE OF PIPE
60894	748904.4113	2086676.1718	5931.98	TOP PVC
60894			5930.94	GROUND N SIDE OF PIPE
60994	748806.5994	2086570.3914	5932.07	TOP PVC
60994			5931.13	GROUND N SIDE OF PIPE
61094	748870.3996	2086634.1066	5932.24	TOP PVC
61094			5931.4	GROUND N SIDE OF PIPE
61194	748848.5481	2086555.3021	5937.27	TOP PVC
61194			5936.23	GROUND N SIDE OF PIPE
61294	748850.4542	2086555.7031	5937.49	TOP PVC
61294			5936.45	GROUND N SIDE OF PIPE
61394	748894.4453	2086506.5618	5945.33	TOP PVC
61394			5944.29	GROUND N SIDE OF PIPE
61494	748894.6844	2086504.7053	5945.49	TOP PVC
61494			5944.45	GROUND N SIDE OF PIPE
61594	748894.9306	2086503.0604	5945.33	TOP PVC
61594			5932.47	GROUND N SIDE OF PIPE
61694	748899.9761	2086682.1118	5929.89	GROUND @ OPENING
61794	748902.9999	2086685.6983	5929.88	GROUND @ OPENING
61894	748898.234	2086687.2137	5929.09	GROUND @ OPENING
61994	748895.305	2086683.186	5929.12	GROUND @ OPENING
72093	752550.2899	2083206.3642	6002.98	TOP STEEL CASING
72093			5988.78	CURRENT G ELEV/PVC UNAVAIL
72393	752552.451	2083196.3464	6002.07	TOP STEEL CASING
72393			5992.07	CURRENT G ELEV/PVC UNAVAIL
1088	749780.5699	2084041.4917	5984.54	#0688 TOP ALUM CAP/SURFACE
B302989	745355.7684	2091266.0436	5709.23	TOP STEEL CASING
B302989			5708.18	TOP PVC
B302989			5706.28	GROUND N SIDE CONC PAD
B317189	748807.5918	2093924.6516	5727.6	TOP STEEL CASING
B317189			5726.6	TOP PVC
B317189			5724.92	GROUND N SIDE CONC PAD
BH-1	751904.1668	2083437.2853	5981.48	GR
BH-2	751902.1876	2083500.9745	5980.32	GR
BH-3	751903.6258	2083571.4097	5978.27	GR
BH-4	751904.3994	2083355.8162	5983.01	GR
BH-5	751891.2786	2083276.6108	5983.26	GR
69194	754134.6654	2084631.3057	5956.26	GR
69294	754052.5738	2084878.5222	5952.71	GR
69394	753985.2669	2085132.1685	5948.25	GR
69494	754163.9390	2084768.3087	5954.39	GR
69594	754111.5404	2084531.9104	5958.11	GR
69694	754094.8201	2084989.0352	5951.16	GR
7287	752441.0873	2083953.0301	5972.30	TOP STEEL CASING
7287			5971.25	TOP PVC
7287			5969.60	GROUND N SIDE CONC PAD

## WELLPTS.TBL

4087	753142.6158	2084822.6544	5885.44	TOP STEEL CASING
4087			5884.61	TOP PVC
4087			5883.00	GROUND N SIDE CONC PAD
5887	752234.1300	2082530.6390	5997.72	TOP STEEL CASING
5887			5996.77	TOP PVC
5887			5995.46	GROUND N SIDE CONC PAD
6687	752149.8493	2083325.0933	5984.77	TOP STEEL CASING
6687			5983.67	TOP PVC
6687			5982.26	GROUND N SIDE CONC PAD
0587BR	748081.1126	2084849.2269	5930.65	TOP STEEL CASING
0587BR			5929.99	TOP PVC
0587BR			5927.85	GROUND N SIDE CONC PAD

Post-it Fax Note 7671		Date 2-7	# of pages 2
To Kathy Wahlberg	From T.P. Lovseth		
Co./Dept. Jacobs	Co. EG&G		
Phone # 620 8483	Phone # 8706		
Fax # 595 8857	Fax # 8663		

MEMO

DATE: February 7, 1995

TO: DISTRIBUTION

FROM: T. P. Lovseth, Hydro Ops, Bldg. 080, X8706

SUBJECT: DATUM CHANGE FOR GROUNDWATER MONITORING WELLS 72093  
AND 72393

The subject groundwater monitoring wells located in the Present Landfill (OU7) had risers installed during the month of August, 1994. The earth moving operations resulted in the placement of fill near these wells which made it necessary to extend the length of casing (risers) for each well to keep up with increase in elevation of the ground surface. Attached is a table that shows the datum change. However, after surveying activities were completed, additional fill was placed around the base of these wells. Therefore, the ground level elevations are not accurate.

The difference between the old and new "top of casing" elevation was added to each of the old well construction measurements to yield the a new value for each well construction measurement. Please use the new top of casing elevations when determining the elevation of the water table for all depth to water measurements made after August, 1994.

Distribution: S.H. Singer  
Kathy Wahlberg  
L.J. Peterson-Wright

COMPILED - February 7, 1995

MON WELL PIEZOMETER											COMPILED - February 7, 1995						
RIP	WELL POINT	TRUE STATE	TRUE STATE	NEW													
WELL	COLL WELL	PLANE	PLANE	WELL													
NAME	INJECT WELL	COMP LOC	NORTH	EAST	CLASS	WELL STATUS	COMPLETION	SURFACE ELEVATION	TOP OF CASING	TD CSG	TOP SCRN	BOT SCRN	TOP BEDROCK	TD BORING			
NEW SURVEY	MW	S	R	11	731330	2083206	CERCTA	INSTALLED	ALLUVIUM	5986.0	5988.30	37.4	30.4	33.4	33.4	37.6	
					731350	2083206			5988.8	6002.77	51.9	44.9	49.9	49.9	52.1		
NEW SURVEY	MW	S	R	12	731332	2083196	CERCTA	INSTALLED	ALLUVIUM	5983.2	5987.20	24.0	12.0	22.0	NP	24.4	
					731332	2083196			5992.1	6001.83	38.6	26.6	34.6	NP	39.0		

GEOTECHNICAL ENGINEERING STUDY  
SEWER LINE INSTALLATION SOUTH OF CENTRAL AVENUE  
ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE  
JEFFERSON COUNTY, COLORADO

JOB NO. 1 527 94

August 19, 1994

PREPARED FOR:

JACOBS ENGINEERING GROUP, INC.  
600 SEVENTEENTH STREET, SUITE 1100N  
DENVER, COLORADO 80202

ATTENTION: MR. MICHAEL TOBIN

August 19, 1994

Jacobs Engineering Group, Inc.  
600 Seventeenth Street, Suite 1100N  
Denver, CO 80202

Attention: Mr. Michael Tobin

Subject: Geotechnical Engineering Study, Proposed Sewer Line Installation South of Central Avenue, Rocky Flats Environmental Technology Site, Jefferson County, Colorado.

Purchase Order No. 05-H606-P-94-1032

Job No. 1 527 94

Dear Mr. Tobin:

At your request, we have conducted a geotechnical engineering study for the proposed sewer line installation at the Rocky Flats Environmental Technology Site in unincorporated Jefferson County, Colorado. Subsurface exploration, sampling and logging was performed by Jacobs Engineering Group.

Subsurface conditions encountered in the three exploratory borings located along the proposed sewer line alignment consist of 3 to 5 feet of native clayey sand with gravel overlain by a thin layer of fill composed of similar granular soils. Sandy claystone bedrock was encountered beneath the granular soils at depths ranging from 4 to 6 feet and continued to the maximum depth explored, 30 feet. The upper 5 to 7 feet of claystone was weathered becoming medium hard to very hard with depth. Ground water was not mentioned in the boring logs.

For design purposes we understand the pipeline invert level will range from approximately 13 to 30 feet below the existing ground surface. Considering the subsurface conditions encountered in the borings, excavation for the sewer line can be accomplished using heavy duty earth excavating equipment. Bracing of the trench excavation will be required in order to stabilize trench walls and reduce the amount of material excavated and the possible impact of construction on surrounding structures and pavements.

The report which follows summarizes our findings and presents our conclusions and recommendations. It is important that a competent geotechnical engineer provide consultation during design, and field services during construction to review and monitor the implementation of the geotechnical recommendations.



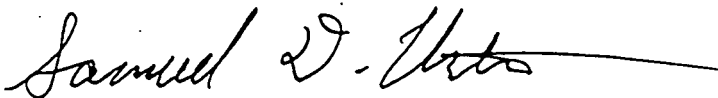
Jacobs Engineering Group, Inc.  
August 19, 1994

Page 2

If you have any questions regarding this report, please contact us.

Respectfully submitted,

Huntingdon Engineering and Environmental



Samuel D. Urton, E.I.T.

Reviewed by:



David A. Glater,



SDU/sdu  
Enclosures

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## PURPOSE AND SCOPE OF STUDY

This report presents the results of a geotechnical engineering study for a proposed sewer line installation at the Rocky Flats Environmental Technology Site in unincorporated Jefferson County, Colorado. The proposed alignment is shown on Fig. 1. The study was conducted for the purpose of developing recommendations with respect to construction of the sewer line including excavatability, dewatering requirements, and backfill procedures. The study was conducted in accordance with the scope of work outlined in your purchase order dated July 14, 1994.

This report has been prepared to summarize the data obtained during this study and to present our conclusions and recommendations based on the proposed construction and the subsurface conditions encountered. Design parameters and a discussion of geotechnical engineering considerations related to construction of the sewer line are included in the report.

## PROPOSED CONSTRUCTION

Our understanding of the proposed construction as described in this section is based on conversations with representatives of Jacobs Engineering Group, Inc. and preliminary site plans provided by Jacobs. The proposed sewer line installation south of Central Avenue near Tent 7 at the Rocky Flats Environmental Technology Site will be approximately 1100 feet long. The pipe invert depth is expected to range from 13 to 30 feet. The pipe will be deepest at manhole #6 where a lift station will be installed. Under Central Avenue the pipeline will be constructed

by jacking. Most of the construction will involve placing the pipe in an open cut trench with an invert level of about 13 feet below ground surface. Excavations below twenty feet will be braced to avoid undermining buildings and trailers in the area and to reduce the volume of soil excavated. Excavated soils are generally re-used for backfilling trench excavations because of cost to dispose of and replace the material. If the design varies from the project description presented above, the recommendations presented in this report should be re-evaluated.

### SITE CONDITIONS

The planned pipeline alignment (see Fig. 1) starts north of Central Avenue and extends south to Tent 7 and then runs east to bypass Tent 7. South of Tent 7 the line runs west to bypass a drum storage facility currently under construction and then runs south. The site is in the industrial portion of the Rocky Flats facility and is currently used primarily as parking for vehicles and temporary office trailers. The site is paved with asphalt from Manhole #2 north and with crushed gravel from Manhole #6 south. From Tent 7 to Manhole #6 the pipeline will be placed beneath an open storm drainage trench. Other impediments to construction such as underground utilities may exist. Vegetation consists of weeds, grass and cattails in the drainage trench. In general the topography slopes gently downward to the east with a maximum elevation difference across the sewer alignment of approximately five to ten feet.

## FIELD EXPLORATION

The general subsurface conditions were investigated by drilling three exploratory borings along the proposed sewer pipeline alignment at the general locations as indicated on Fig. 1. Graphic logs of the borings are presented on Fig. 2. Figure 3 is a legend presenting a description of the materials encountered and notes associated with the field investigation. The borings were advanced through the overburden soils and underlying bedrock with hollow stem continuous flight augers. The boring locations were selected by a representative of EG & G. Drilling procedures, sample collection and logging were managed by Jacobs Engineering Group, Inc.

Samples of the subsurface materials were obtained with a 1 3/8-inch I.D. split spoon or 2 3/8-inch I.D. sampler. The sampler was reportedly driven into the various strata using a 140-pound hammer falling 30 inches. The number of blows required to advance the sampler one foot is recorded. This is the standard penetration test described by ASTM Method D-1586. Penetration resistance values provide an indication of the relative density or consistency of the soils. Depths at which the samples were obtained and the penetration resistance values are shown on the Boring Logs, Fig. 2.

Measurements of the ground water level were not made in the borings. However, the samples as received in the laboratory were not wet but in a moist condition. Since the site is located on top of a ridge with deep valleys to the north and south, it is reasonable to expect that

ground water may not be encountered during construction. Permeable lenses with perched ground water that were not uncovered in the exploration program may exist.

## LABORATORY INVESTIGATION

After drilling, samples from the project were delivered to our laboratory facilities by a representative of Jacobs. We carried out a laboratory testing program established by Jacobs as specified by EG & G consisting of grain size analysis, Atterberg limit testing, flexible wall permeability, direct and triaxial shear strength testing, and expansion potential. We also performed a swell/consolidation test to be used in developing our recommendations. The results of the grain size analyses are presented in Figs. 4 through 9. The results of the swell/consolidation test are presented in Fig. 10, and the results of the direct and triaxial shear testing are presented in Figs. 11 and 12 respectively. Permeability test results are given in Table II, and Table I contains a summary of other testing.

Direct shear testing was performed at three pressures on a consolidated, drained sample. The sample was repositioned and reconsolidated before performing the shear test at the higher pressures. Triaxial shear testing was performed at three pressures on three unconsolidated undrained samples.

## SUBSURFACE CONDITIONS

Subsurface conditions encountered in the three exploratory borings drilled along the sewer line alignment consist of three to five feet of native clayey sand with gravel overlain by a thin layer of fill composed of similar granular soils. Sandy claystone bedrock was encountered beneath the granular soils at depths ranging from 4 to 6 feet and continued to the maximum depth explored 30 feet.

Granular Soils: Native clayey sand with gravel (SC) is loose to medium dense and fill composed of similar granular soils is medium dense to very dense based on the blows counts recorded by Jacobs. Percent minus 200 (silt and clay fines) ranged from 35 to 46, liquid limits ranged from 35 to 69 and plasticity indices ranged from 17 to 37.

Claystone: Claystone (CL to CH) is lean to fat, with weathered consistency, becoming medium to very hard with depth. Percent minus 200 ranged from 61 to 100 and percent passing the 0.002 micron size ranged from 40 to 82. Liquid limits ranged from 36 to 66 and plasticity indices ranged from 18 to 41. The sample from 29.5 to 30 feet in boring 52394 had a moderate swell potential, 2.3%, when wetted at a load of 1,000 psf.

## ENGINEERING ANALYSIS AND RECOMMENDATIONS

### EXCAVATIONS

Excavation of the fill, native granular soils and claystone bedrock to the depths planned can probably be accomplished with conventional earth excavating equipment. Trench side slopes in the native soils and bedrock should stand at near vertical for a sufficient length of time to install the bracing system, if required, unless adversely effected by ground water seepage,

vibrations, or surcharge loads, such as stockpiled soil or construction equipment. While it is the responsibility of the contractor to provide safe working conditions and to comply with OSHA standards in connection with underground excavations, the following guidelines are provided for planning purposes. Temporary construction excavations less than 20 feet in depth should be no steeper than shown below or should be shored.

<u>OSHA Classification, Soil Type</u>	<u>Slope Inclination Horizontal to Vertical</u>	
	<u>Above Ground water</u>	<u>Below Ground water</u>
Type B, Fill, Clayey Gravel with Sand, Weathered** to Hard Claystone Bedrock	1:1	1 1/2:1*
Type C, Soft to Weathered** Claystone Bedrock	1 1/2:1	1 1/2:1*

\* Or should be shored.

\*\* Strength testing was not requested in the weathered claystone bedrock. It may classify as Type B or Type C depending on the unconfined compressive strength.

We anticipate that the spacial constraints of the site will not permit sloped excavations below 20 feet. Therefore, shoring will likely be required below 20 feet. If unbraced trench walls are contemplated below 20 feet, we can provide design consultation.

Care should be taken while excavating adjacent to existing facilities since the excavation could impact existing foundations. Existing facilities should be monitored and if movement or distress is noted the installation requirements or methods may need to be re-evaluated. We suggest that the existing facilities which may be impacted during construction be inventoried for distress or pre-existing conditions, including detailed photographs.

BACKFILL



The on-site granular soils are considered to be suitable material for compacted backfill. The on-site claystone bedrock will have an expansion potential when compacted, however, this potential may be reduced by placing the claystone wet of optimum. If soil heave cannot be tolerated, an imported, non-expansive fill should be used in place of the claystone. The on-site soil and bedrock should be processed so that the fill does not contain cobbles, boulders, or fragments larger than 4 inches in diameter. This is particularly important within 3 feet of the pipe to prevent the formation of concentrated point loads on the pipe wall.

To minimize distress due to soil expansion, backfill placed within 2 feet of manholes and other vertical structures should be non-expansive impervious structural fill. On-site granular alluvial soils appear to meet these requirements.

All backfill should be placed in uniform lifts compatible with the type of compaction equipment being used, moisture conditioned to within 0% to +4% of the optimum moisture content for on-site claystone and to  $\pm 2\%$  of optimum for imported or on-site granular soils and compacted with appropriate equipment for the lift thickness placed. Generally uncompacted lift thickness should be less than or equal to 8 inches for on-site claystone and less than or equal to 12 inches for import or on-site granular materials. The backfill should be compacted to at least 95% of the maximum standard Proctor density (ASTM D-698). The owner should be aware that even with ideal backfill compaction, there remains a possibility of some settlement of backfill. We estimate that the surface settlement will be approximately  $\frac{1}{2}\%$  to 1% of the height of the backfill.

#### MINIMUM PIPE COVER

The minimum depth in the "Proposed Construction" paragraph, 13 feet, is sufficient to provide protection from frost and traffic loading. If the depths are changed a minimum depth

of 3 feet should be maintained for frost protection and a minimum depth of 5 feet should be maintained for protection against normal traffic loadings.

## DEWATERING

Dewatering along the proposed pipeline alignment should not be required unless perched ground water conditions are encountered. Considering the laboratory test results and published criteria for similar soils, we estimate the permeability of the granular soils to be about  $1 \times 10^{-6}$  cm/sec. Permeability testing indicates that the upper levels of the claystone bedrock will have permeabilities between  $1 \times 10^{-6}$  cm/sec and  $1 \times 10^{-8}$  cm/sec.

## DESIGN PARAMETERS

Structures for the sewer line, manholes and a lift station, will be constructed on the weathered to hard claystone and be subject to lateral earth pressure. A portion of the lift station may also have fill placed above it.

Since the consolidated, drained shear testing was performed by reconsolidating the sample, the values for cohesion and internal friction angle are slightly lower than for the unconsolidated, undrained triaxial tests. Consolidated testing should give higher values for cohesion and internal friction angle. We, therefore, recommend that design parameters for short and long term conditions both be based on the results of the unconsolidated shear testing and the blow counts from the standard penetration testing.

At rest lateral earth pressures should be calculated using an equivalent fluid unit weight of 70 pcf, ( $K_0=0.54$ ). Where soil is able to move sufficiently to mobilize its full strength, active lateral earth pressures may be calculated using an equivalent fluid unit weight of 45 pcf, ( $K_a=0.35$ ), and passive lateral earth pressures may be calculated using an equivalent fluid unit

weight of 300 pcf, ( $K_p=2.3$ ). Vertical overburden pressures should be calculated using a wet unit weight of 130 pcf for backfill materials.

## PROTECTION OF FOUNDATIONS

Protection of existing foundations along the proposed alignment will be of particular concern due to construction disturbance and possible settlement. In order to reduce the potential for structural distress caused by excavation of the pipeline, it may be necessary to provide shoring of the excavation and possible underpinning of existing foundations during construction. The influence of foundations on the shoring system should be considered.

If movement is detected by elevation surveying, building distress, observation of cracks in the ground surface, or other means during construction, an additional study to determine existing foundation conditions will be required so that an underpinning system can be selected and designed.

## PIPE BEDDING

Pipe bedding should be placed at least to the springline of the pipe. Review of laboratory data for the excavated clayey gravel with sand and claystone indicate that these materials are considered to be unsuitable for use as bedding. A coarser grained material such as AASHTO M43. No. 8. Denver Water Board "Well Graded Sand", or similar material should be considered as bedding.

## WATER SOLUBLE SULFATES

Claystone bedrock typically has a potential for high concentrations of water soluble sulfate compounds, particularly in calcareous deposits. Although no calcareous deposits were

observed in the samples delivered to our laboratory or indicated on the boring logs, the use of sulfate resistant concrete should be considered for this project.

### BURIED METAL CORROSION

Based on the laboratory data and our experience with similar soils in this area we estimate the soils to be slightly aggressive to aggressive toward buried metal. A corrosion specialist should be consulted to determine appropriate protection measures.

### CONTINUING SERVICES

Two additional elements of geotechnical engineering service are important to the successful completion of this project.

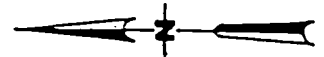
- (1) Consultation with design professionals during the design phases. This is important so the intentions of our recommendations are properly incorporated in the design, and that any changes in the design concept properly consider geotechnical aspects.
- (2) Observation and monitoring during construction. A competent geotechnical engineer should observe the excavation, earthwork, and foundation phases of the work to judge that subsurface conditions are compatible with those used in the analysis and design. During construction, placement of backfill should be observed and tested to confirm that the proper placement conditions have been achieved.

### LIMITATIONS

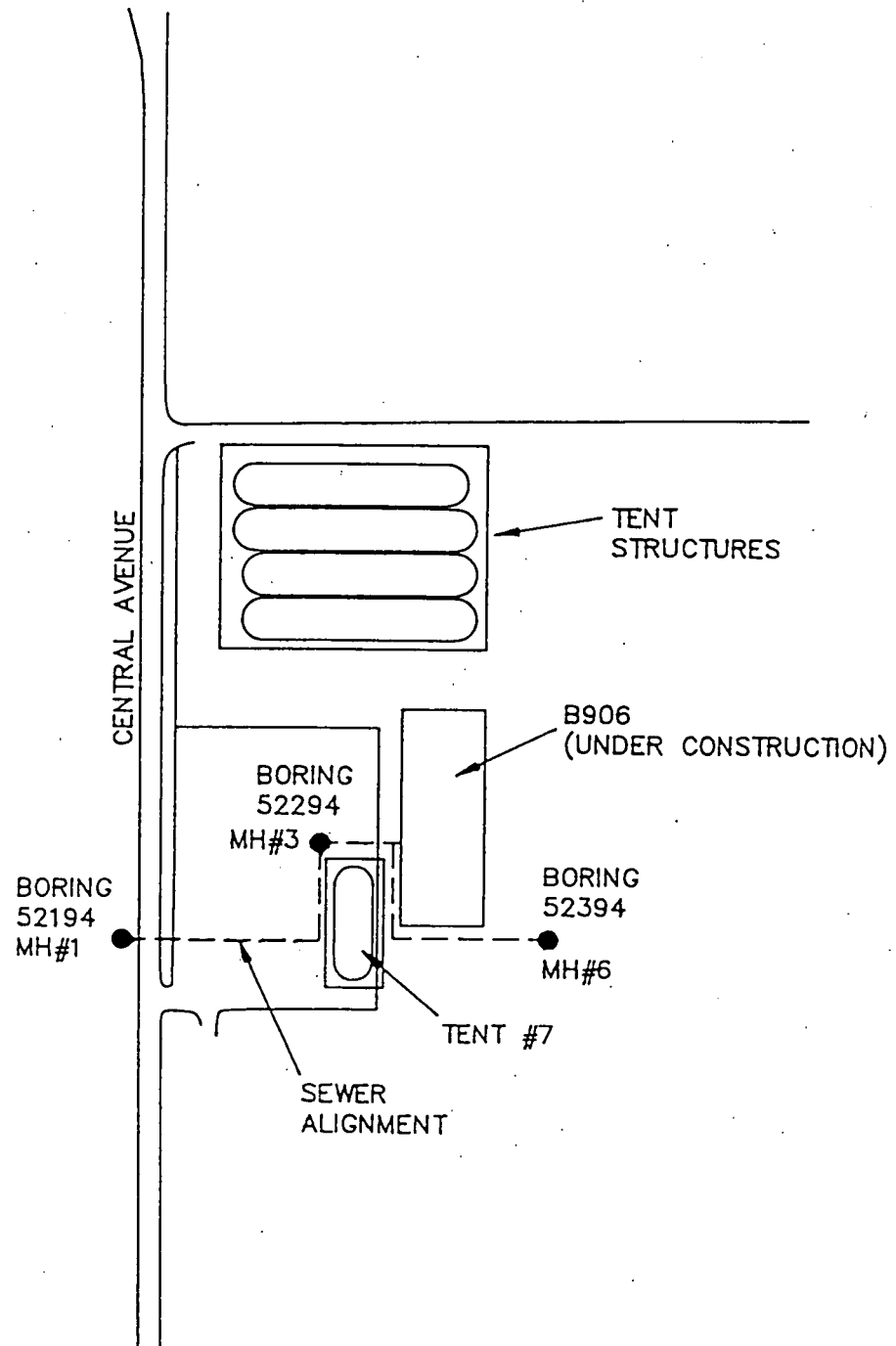
This report has been prepared in accordance with generally accepted geotechnical engineering principles and practices in this area at this time. We make no other warranty either

expressed or implied. The conclusions and recommendations submitted in this report are based upon the data obtained from the widely spaced exploratory borings drilled at the locations established by EG & G and indicated on Fig. 1, the proposed type of construction and our experience in the area. Our findings include interpolation and extrapolation of the subsurface conditions identified at the exploratory borings and variations in the subsurface conditions may not become evident until excavation is performed. If conditions encountered during construction appear to be different from those described in this report, we should be notified at once so re-evaluation of the recommendations may be made.

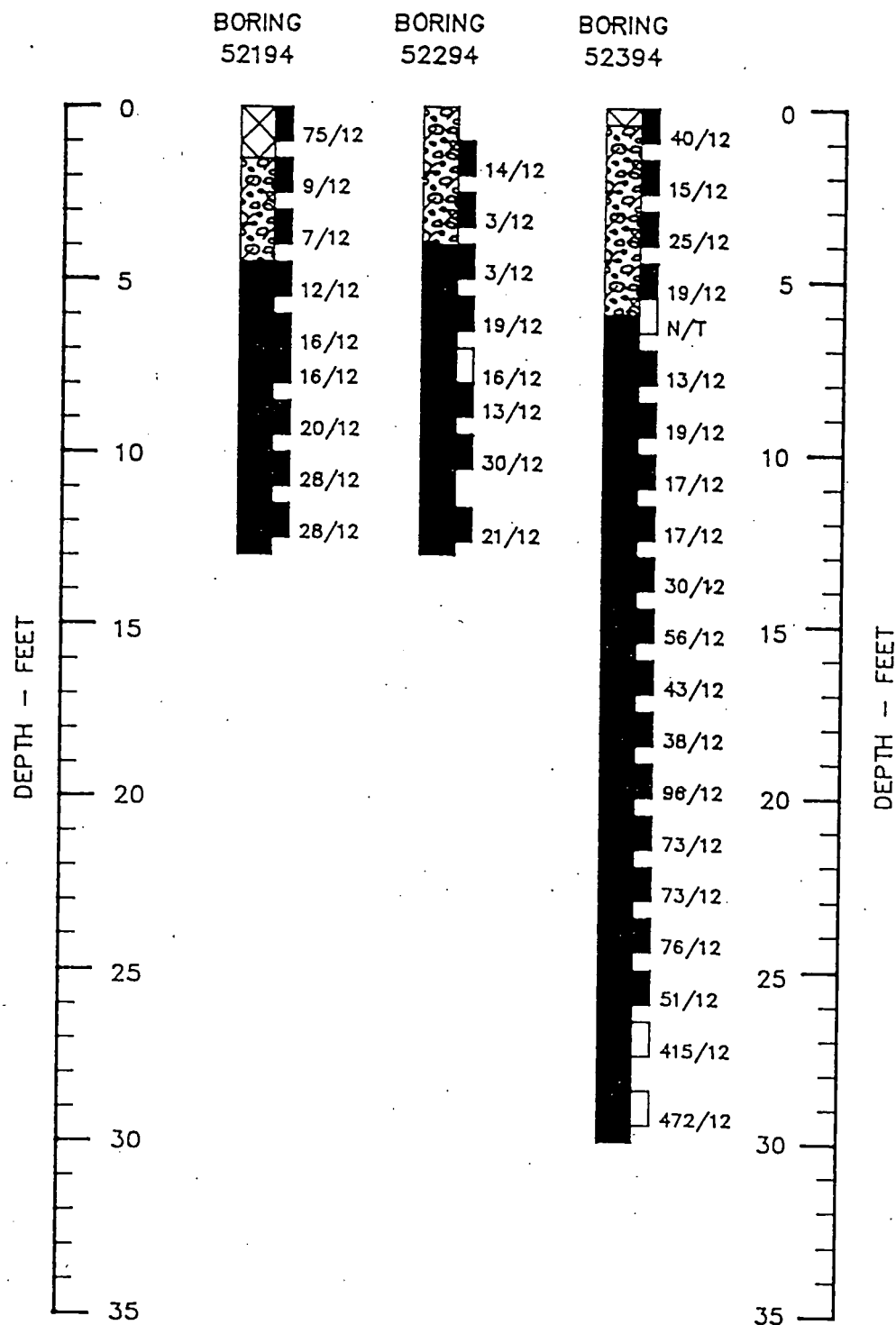
This report has been prepared for the exclusive use by our client for design purposes. We are not responsible for technical interpretations by others of the exploratory information which has not been described or documented in this report. As the project evolves, we should provide continued consultation and field services during construction to review and monitor the implementation of our recommendations, and to verify that the recommendations have been appropriately interpreted. Significant design changes may require additional analysis or modifications of the recommendations presented herein. We recommend on-site observation of excavations and foundation bearing strata and testing of structural fill by a representative of the geotechnical engineer.



NOT TO SCALE



ROCKY FLATS ENVIRONMENTAL  
TECHNOLOGY SITE  
PROPOSED SEWER ALIGNMENT



ROCKY FLATS ENVIRONMENTAL  
TECHNOLOGY SITE  
PROPOSED SEWER ALIGNMENT

#### LEGEND



FILL, gravel, poorly graded, clayey, with sand.



GRAVEL (GC), clayey, with sand, loose to medium dense, dry.



CLAYSTONE, medium to high plasticity, with sand, soft to very hard, moist, gray and white mottled.



Drive Sample, 2 3/8-inch I.D. California liner sample.



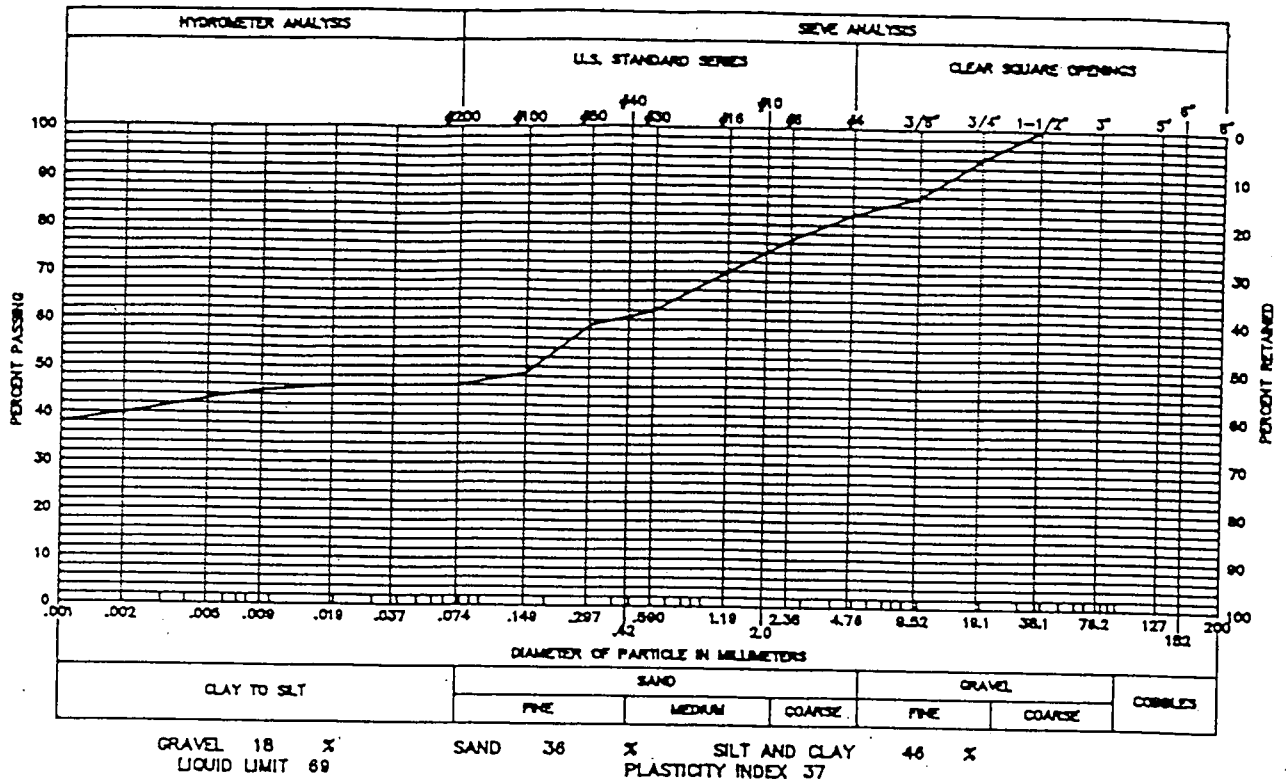
Drive Sample, 1 3/8-inch split spoon sample.

40/12 Drive sample blow count. Indicates that 40 blows of a 140-pound hammer falling 30 inches were required to drive the Split spoon or California sampler 12 inches.

#### LEGEND

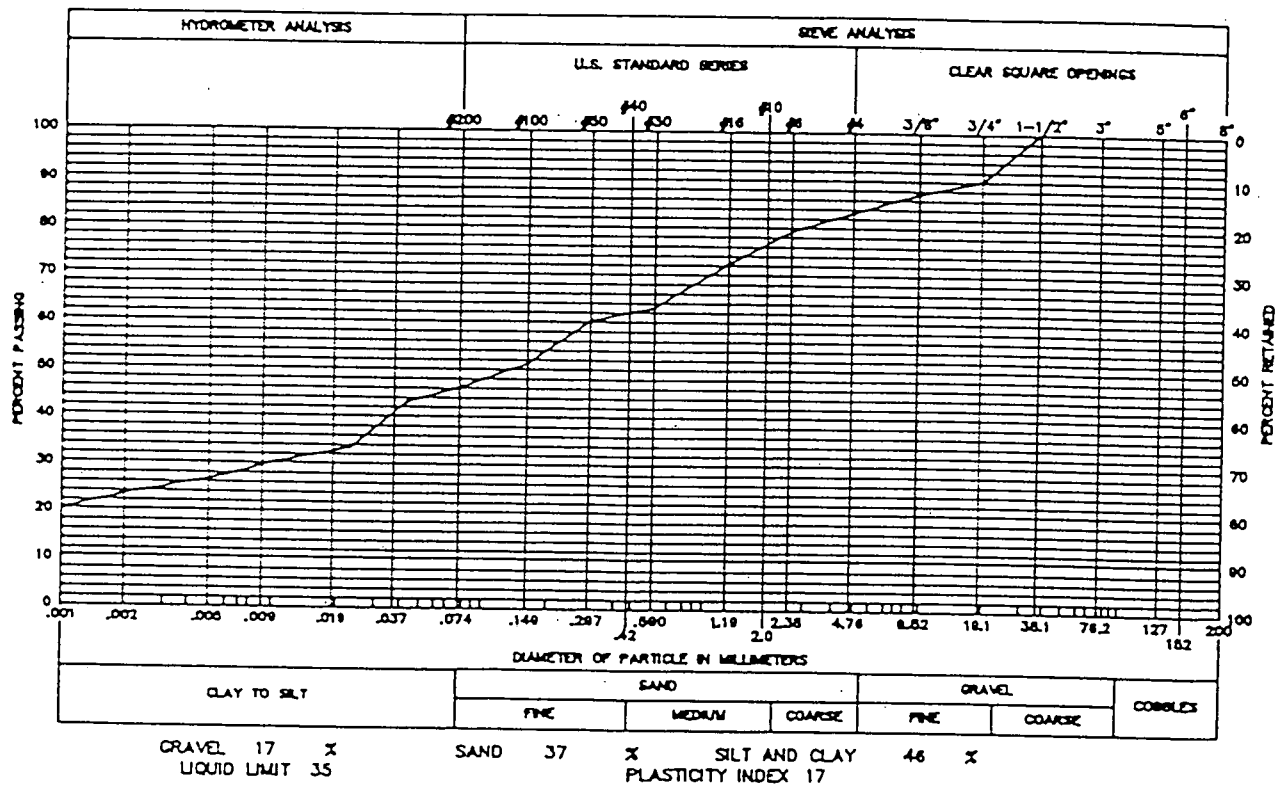
1. Exploratory borings were drilled, sampled, and logged by the client.
2. Site plan and locations of exploratory borings were provided by the client.
3. Elevations of exploratory borings were not measured and logs of exploratory borings are drawn to depth.
4. The exploratory boring locations and elevations should be considered accurate only to the degree implied by the method used.
5. Ground water was not encountered in the borings at the time of drilling.





SAMPLE OF Very Clayey Sand with Gravel

FROM SAMPLE NO. BH00201JE 52394 @ 1.5-3.5 ft



SAMPLE OF Clayey Sand with Gravel

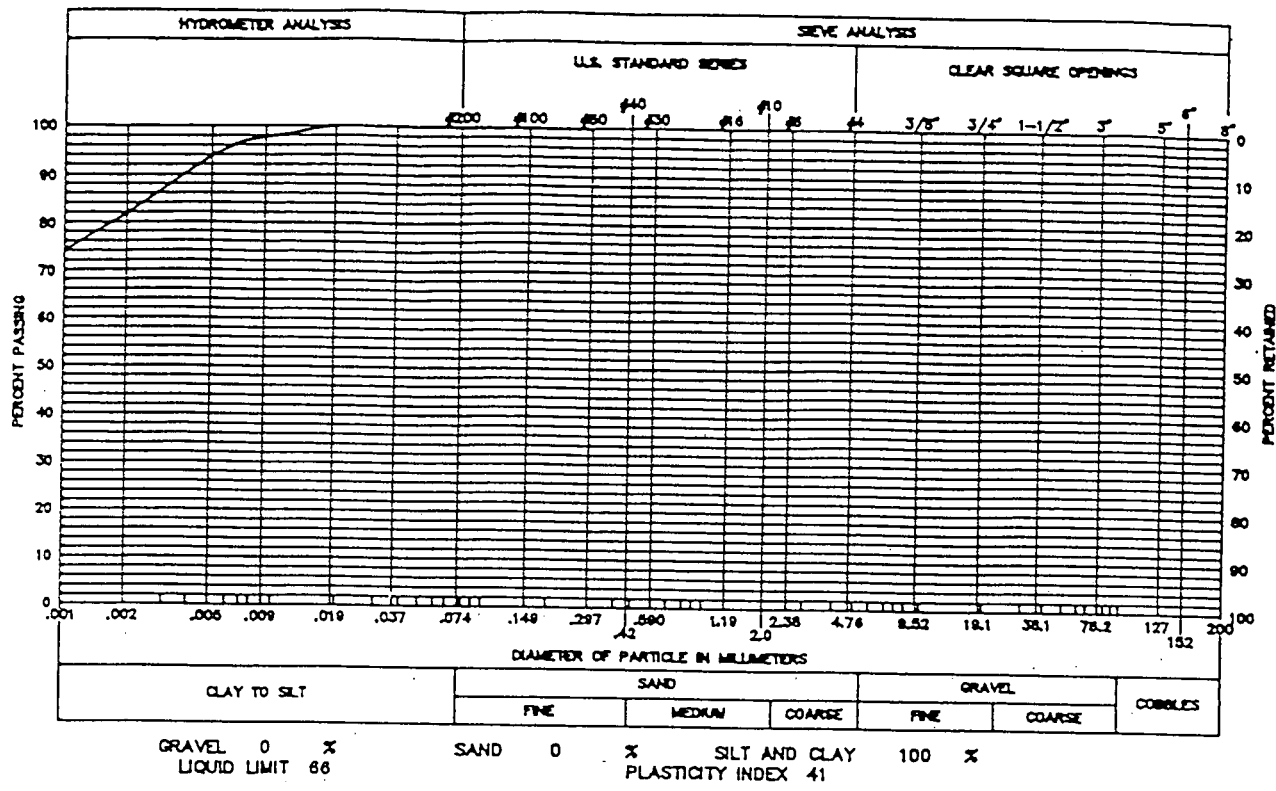
FROM SAMPLE NO. BH00202JE 52394 @ 3.5-5.5ft

1 527 94

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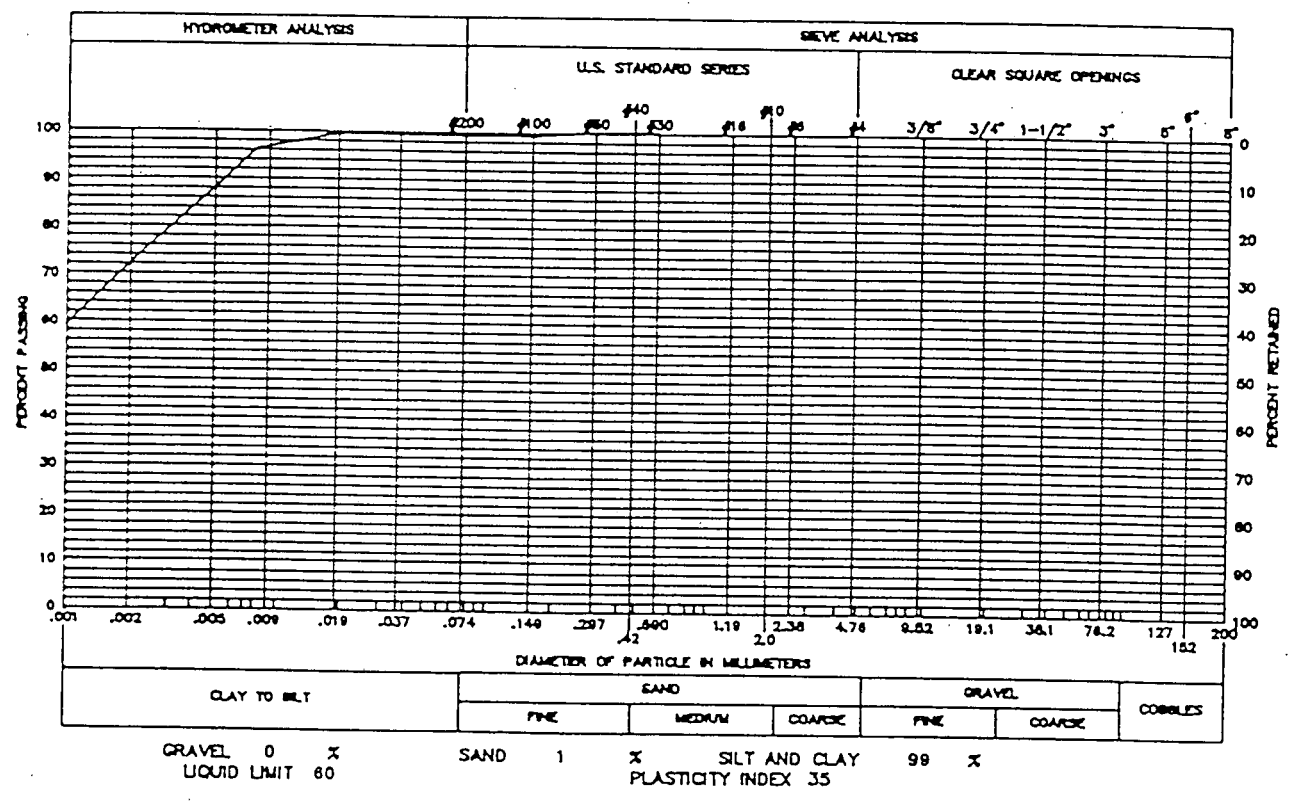
GRADATION TEST RESULTS

Fig. 4



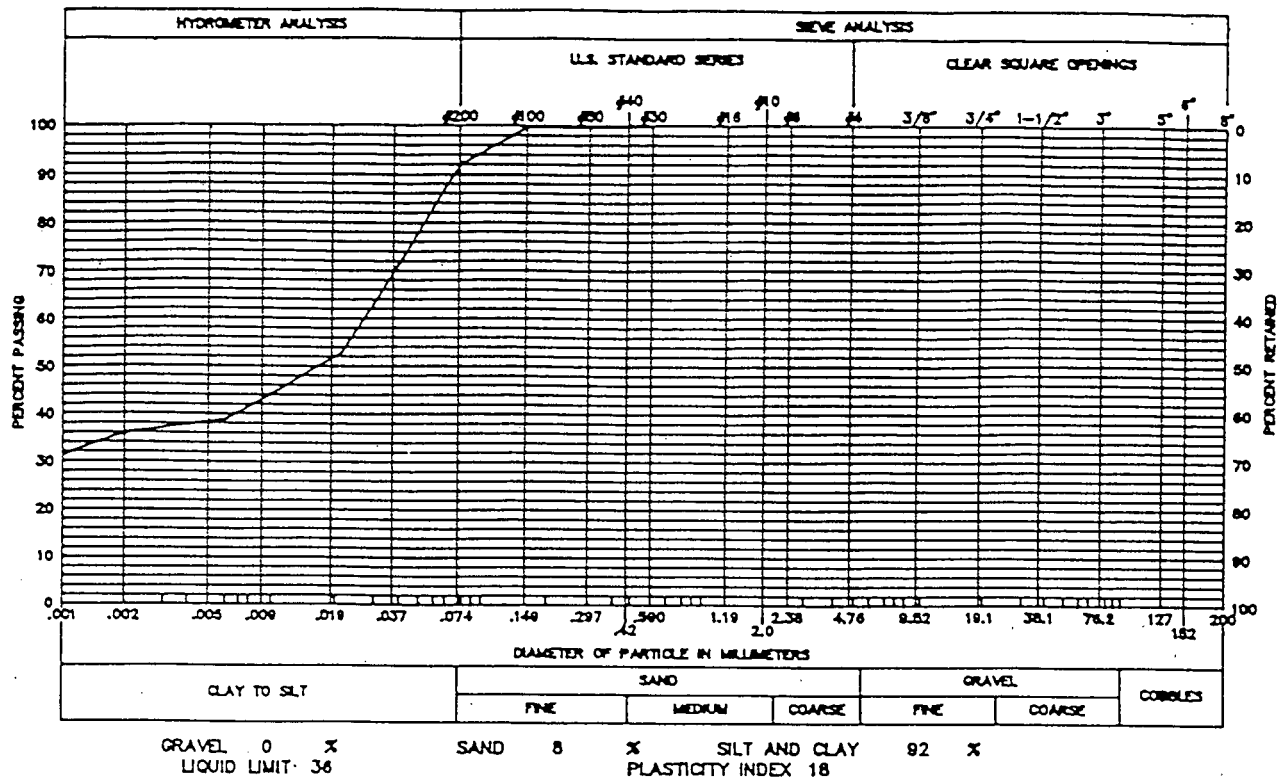
SAMPLE OF Fat Claystone

FROM SAMPLE NO. BH00204JE 52394 @ 7-9 ft



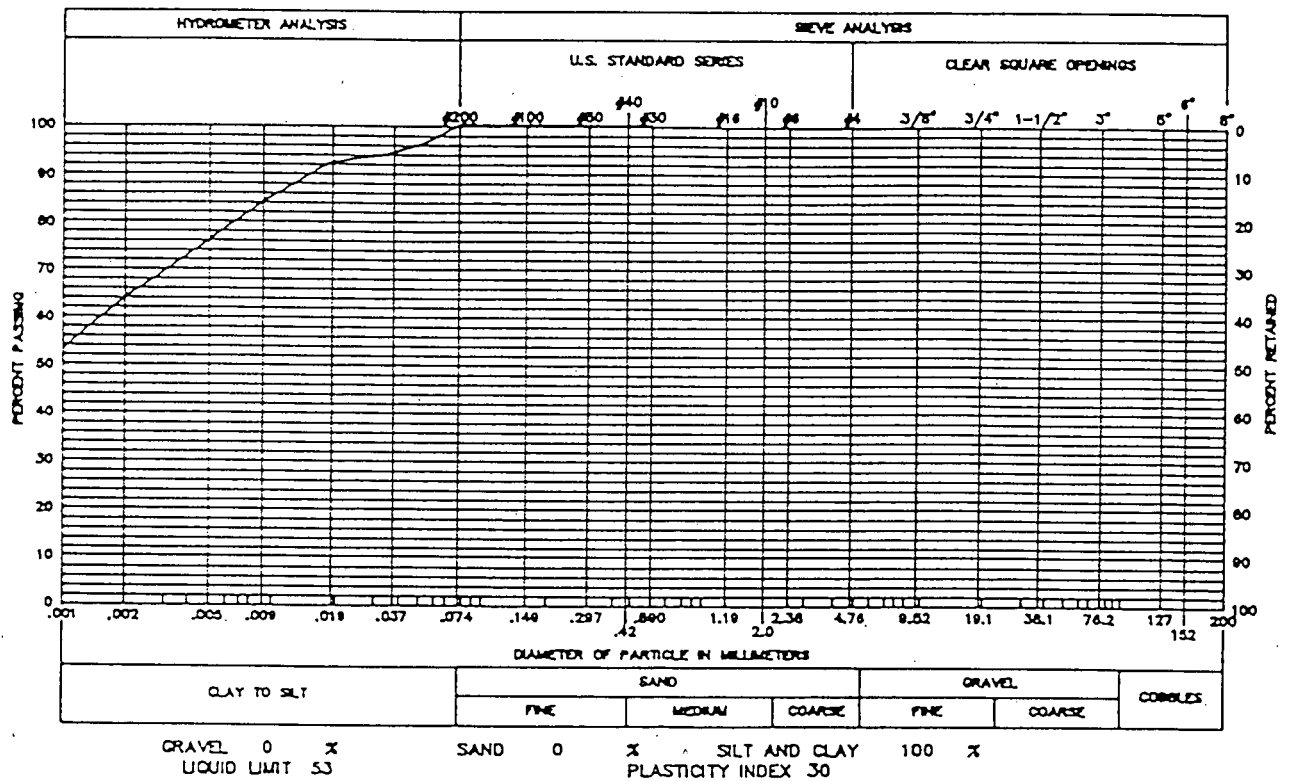
SAMPLE OF Fat Claystone

FROM SAMPLE NO. BH00205JE 52394 @ 10.5-12.5ft



SAMPLE OF Slightly Sandy Claystone

FROM SAMPLE NO. BH00208JE 52394 15.5-17 ft



SAMPLE OF Fat Claystone

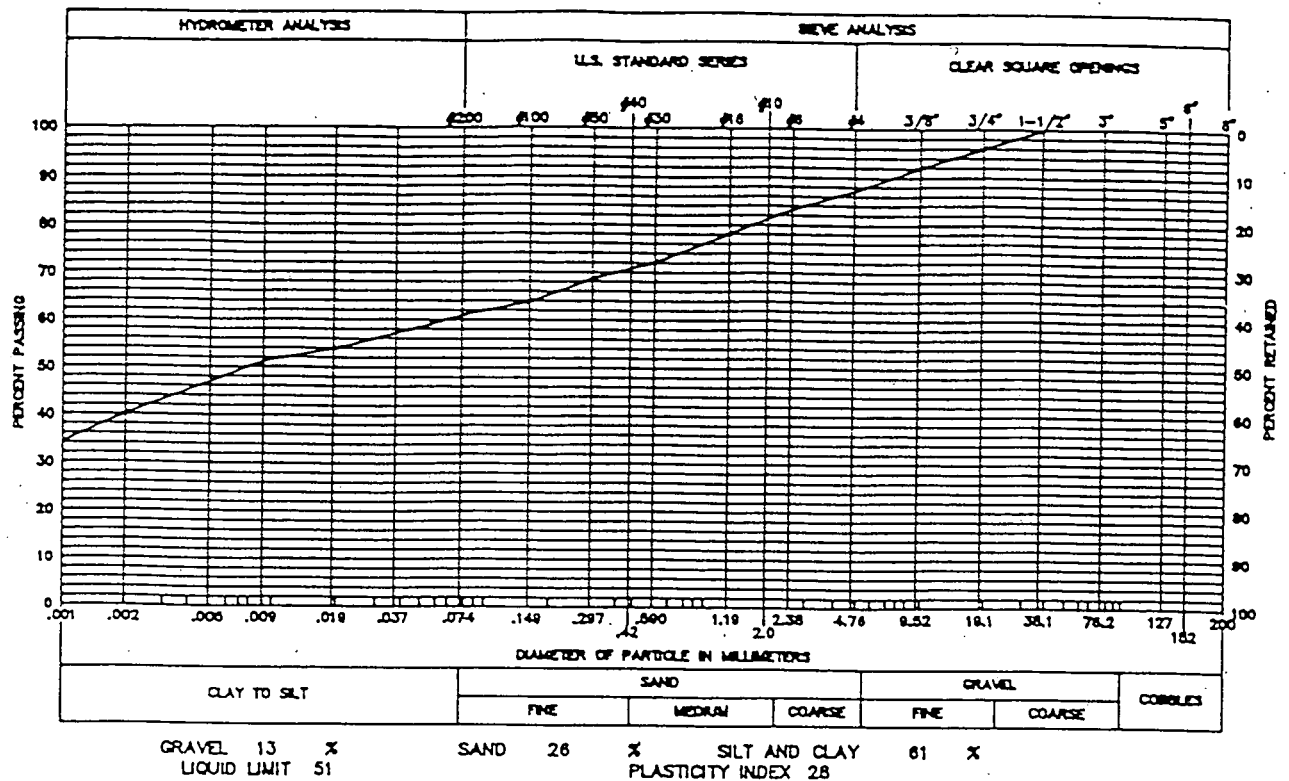
FROM SAMPLE NO. BH00207JE 52394 @ 24-26ft

1 527 94

**Huntingdon**

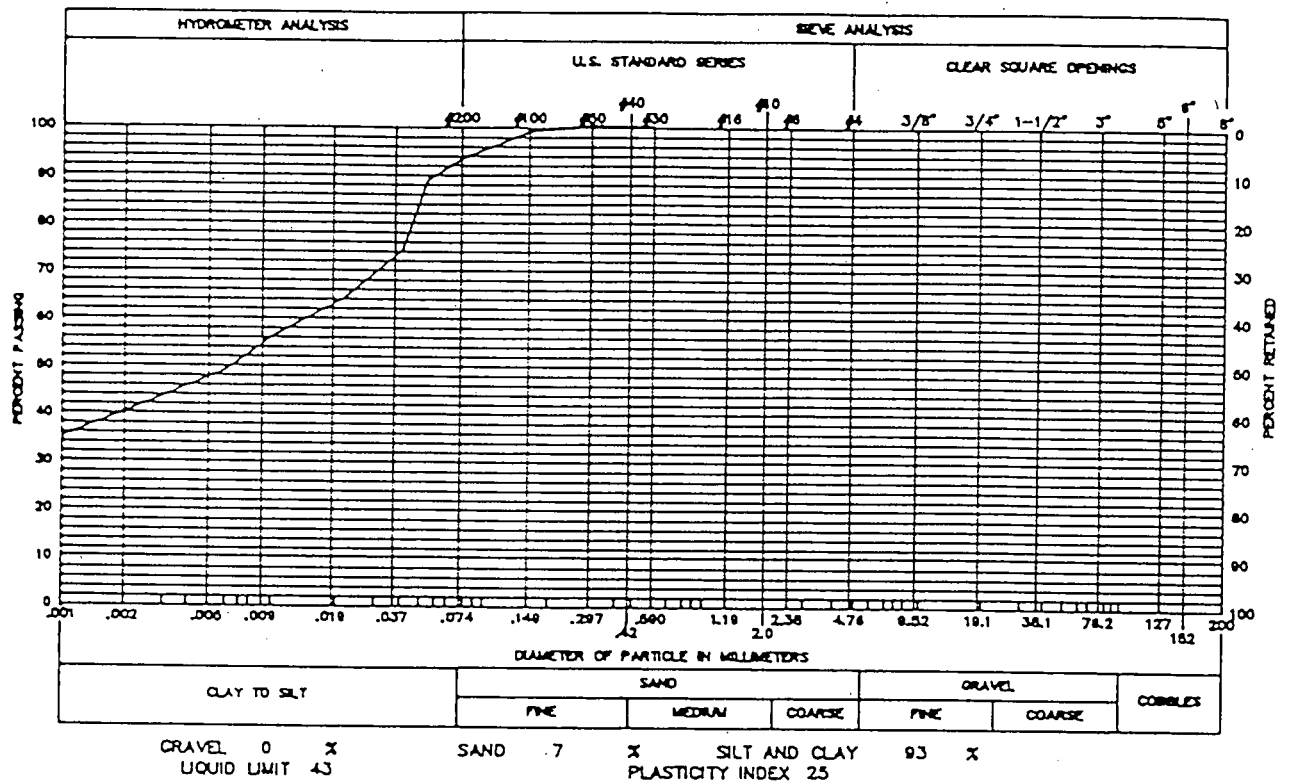
GRADATION TEST RESULTS

Fig. 6



SAMPLE OF Sandy Fat Claystone

FROM SAMPLE NO. BH00210JE 52294 @ 4-8.5 ft



SAMPLE OF CLAY STONE

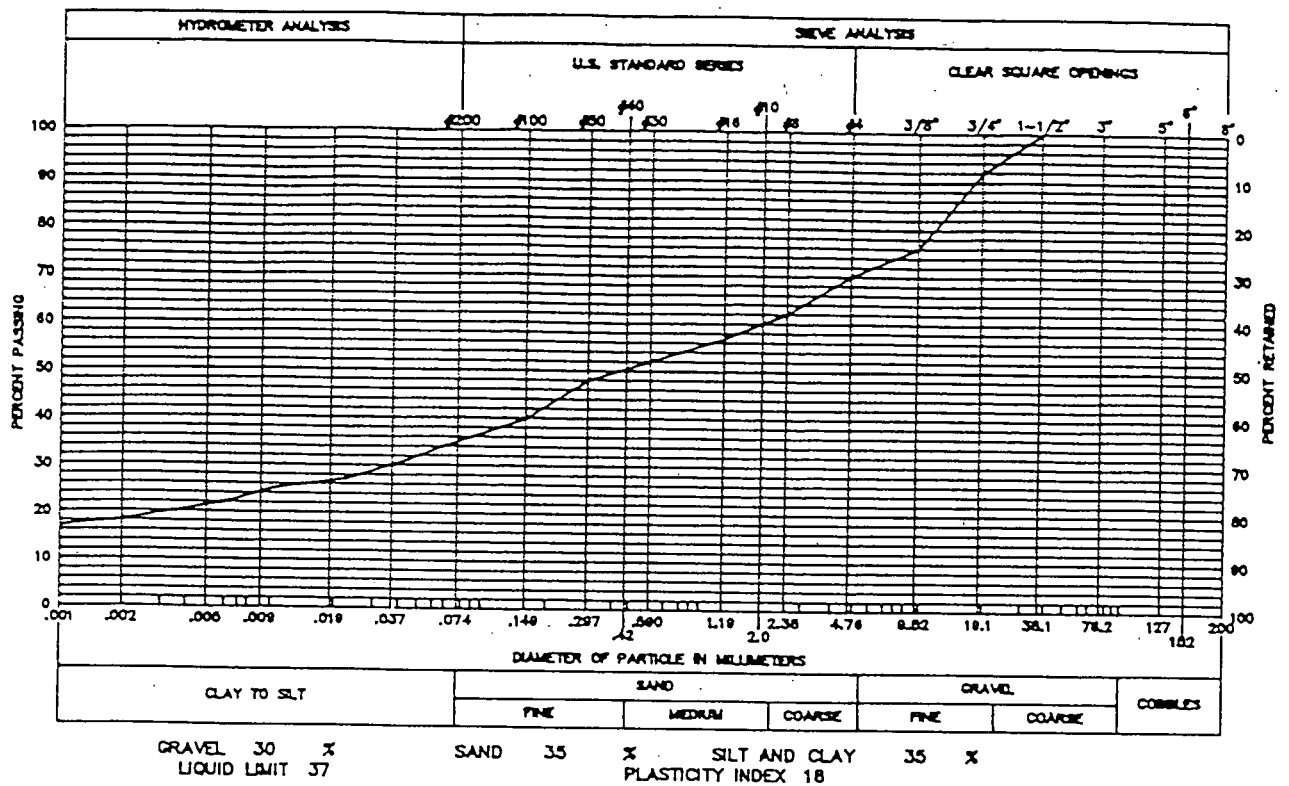
FROM SAMPLE NO. BH00211JE 52294 @ 8.5-11.5 ft

1 527 94

**Huntingdon**

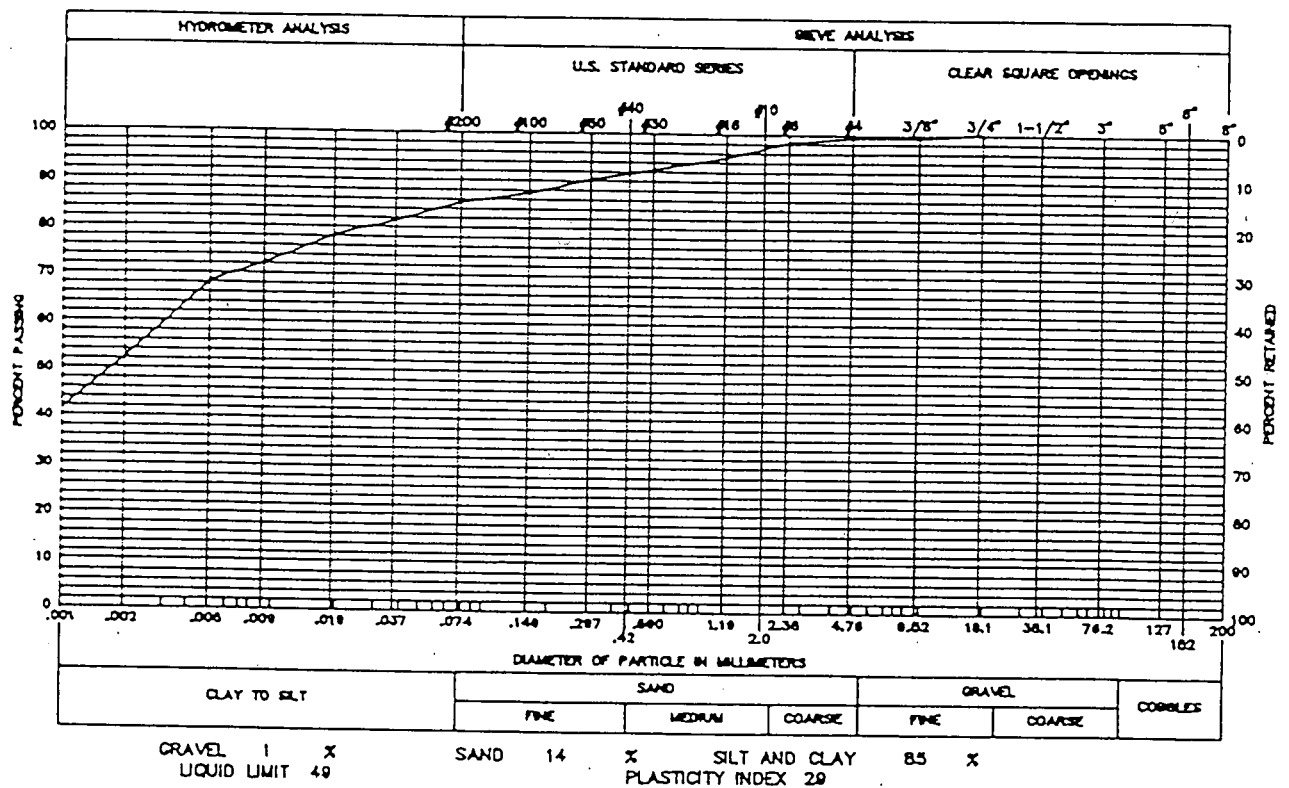
GRADATION TEST RESULTS

Fig. 7



SAMPLE OF Clayey Sand with Gravel

FROM SAMPLE NO. BH00212JE 52194 @ 0.5-2.5 ft



SAMPLE OF Claystone with Sand

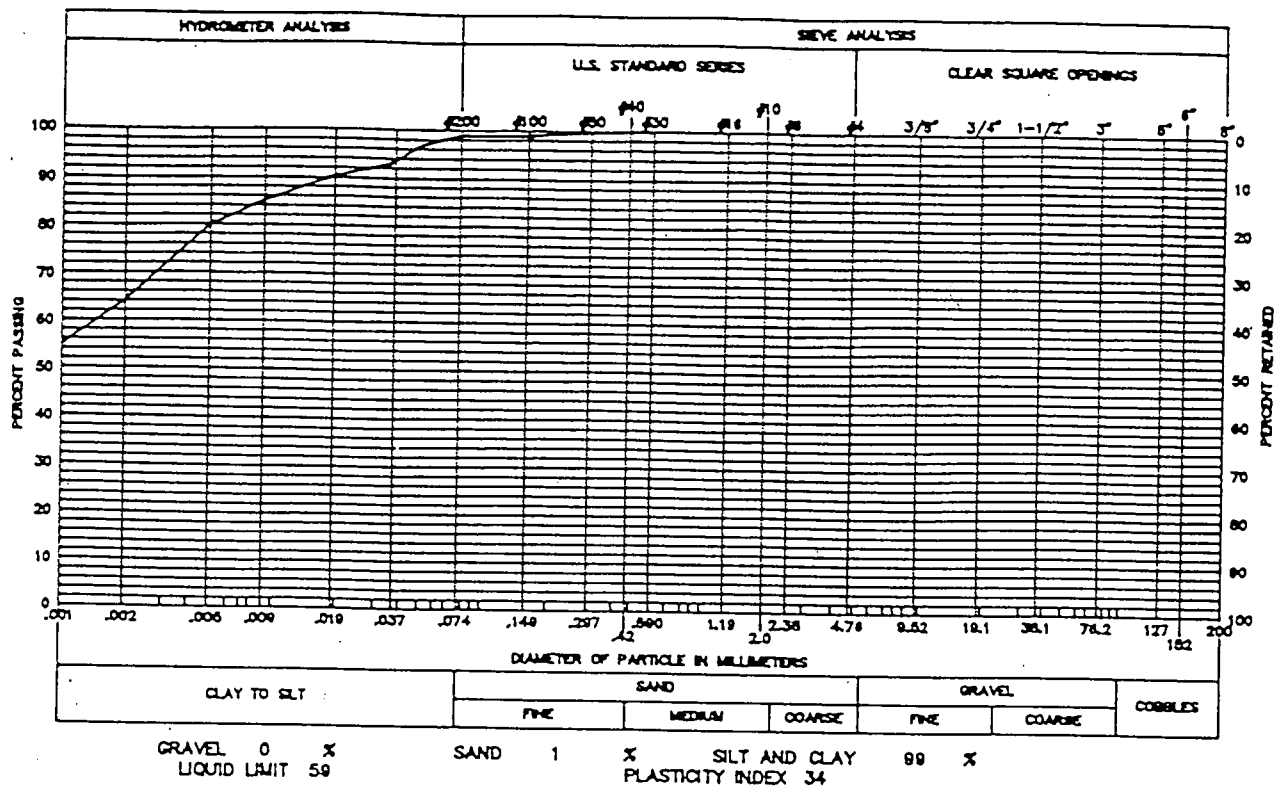
FROM SAMPLE NO. BH00213JE 52194 @ 4.5-6.5 ft

1 527 94

**Huntingdon**

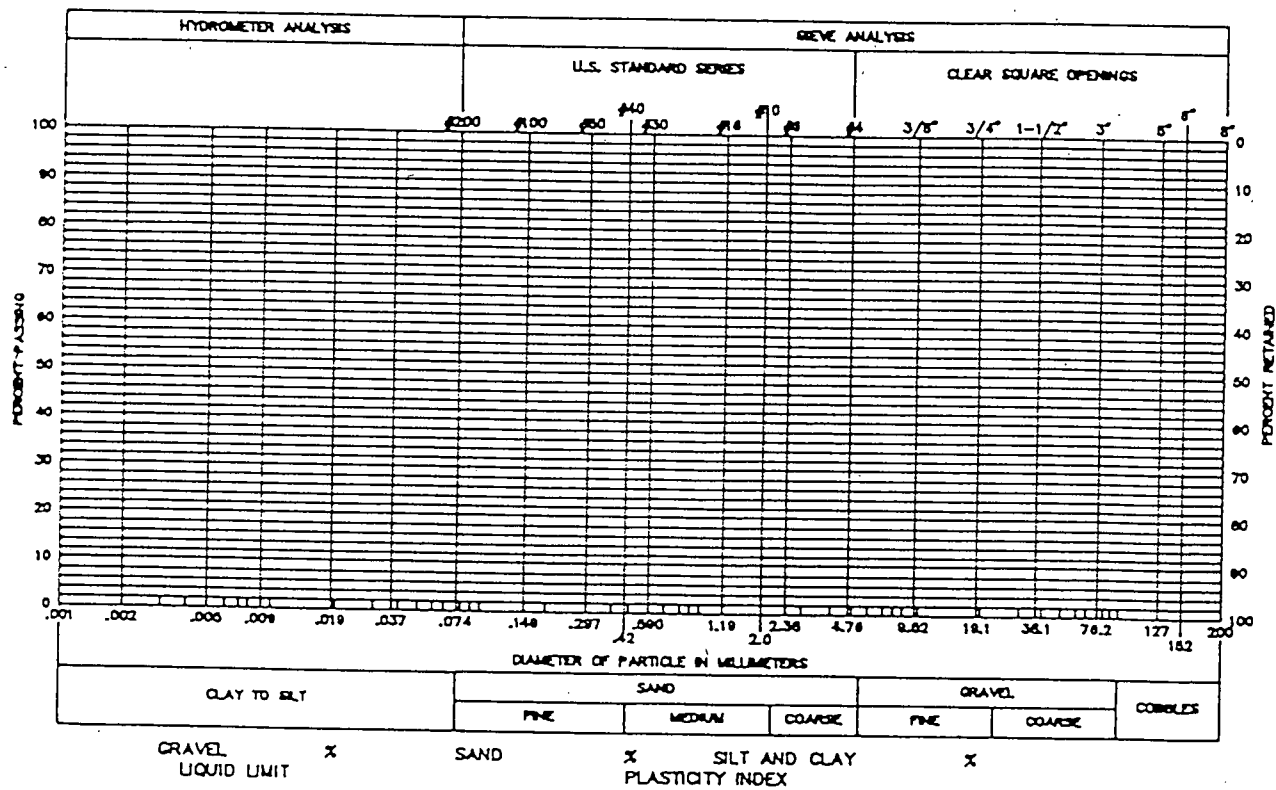
GRADATION TEST RESULTS

Fig. 8



SAMPLE OF Claystone

FROM SAMPLE NO. BH00215JE 52194 @ 7.5-10.5 ft



SAMPLE OF

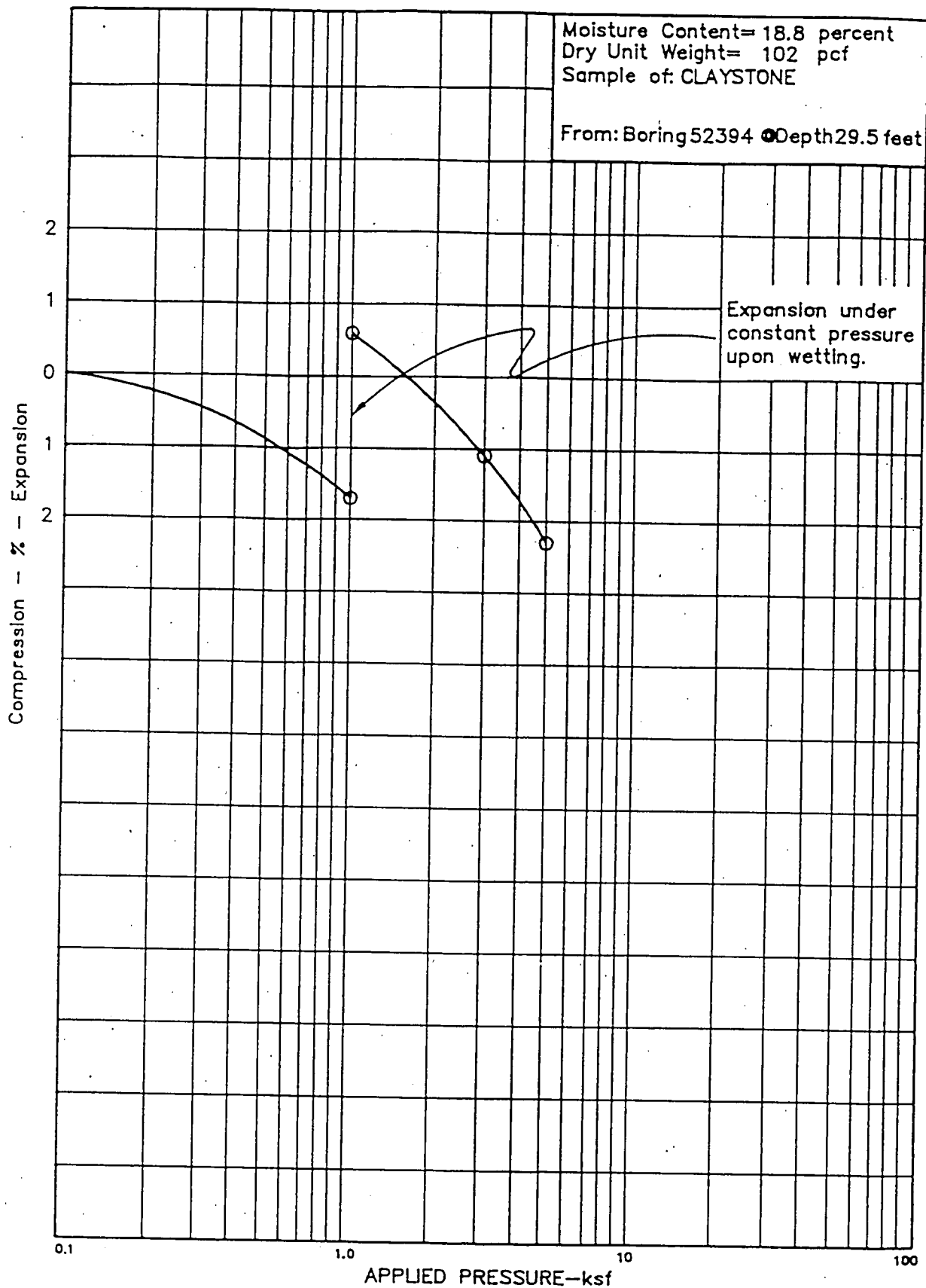
FROM

1 527 94

Huntingdon

GRADATION TEST RESULTS

Fig. 9



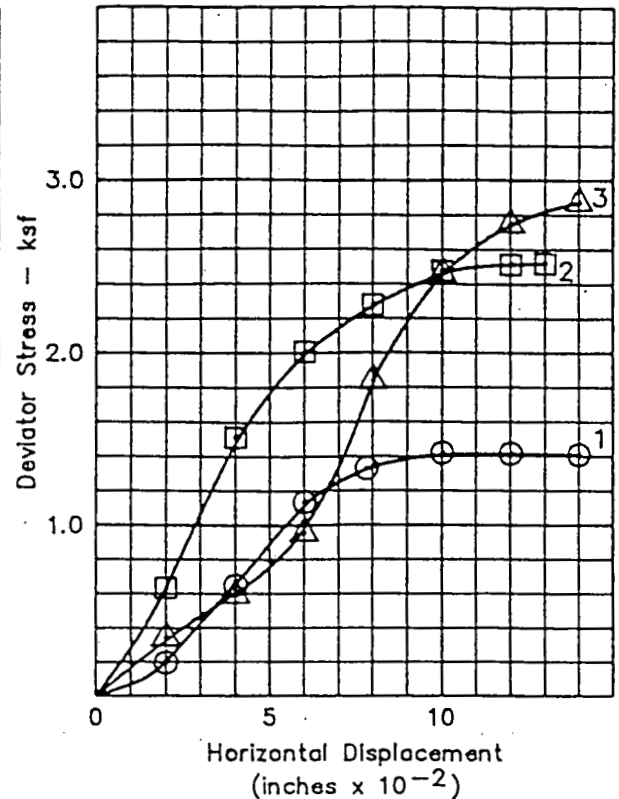
Consulting Soil and Foundation Engineers

TEST NUMBER	1	2	3	4
LOCATION	HOLE 52394 ● DEPTH 28.5-29.5 ft. SAMPLE BH00208JE			
HEIGHT - INCH	1.032	1.023	0.988	
DIAMETER - INCH	1.805	1.805	1.805	
WATER CONTENT - %	30.6	26.5	24.4	
DRY DENSITY - pcf	93	99	103	
CONSOL LOAD - ksf	1.26	2.53	3.79	
NORMAL LOAD - ksf	1.26	2.53	3.79	
SHEAR STRESS - ksf	1.41	2.56	2.86	

TYPE OF SPECIMEN CALIFORNIA LINER

SOIL DESCRIPTION CLAYSTONE

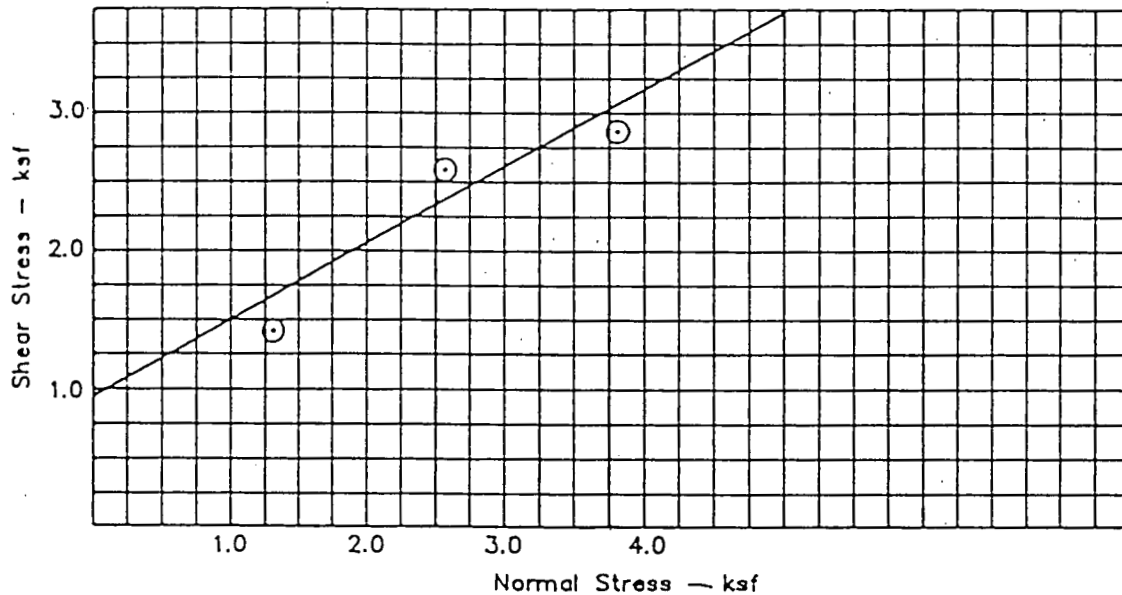
TYPE OF TEST CONSOLIDATED, DRAINED  
DIRECT SHEAR.



TAN  $\phi$  0.57

$\phi$  29.7°

COHESION - ksf 0.9





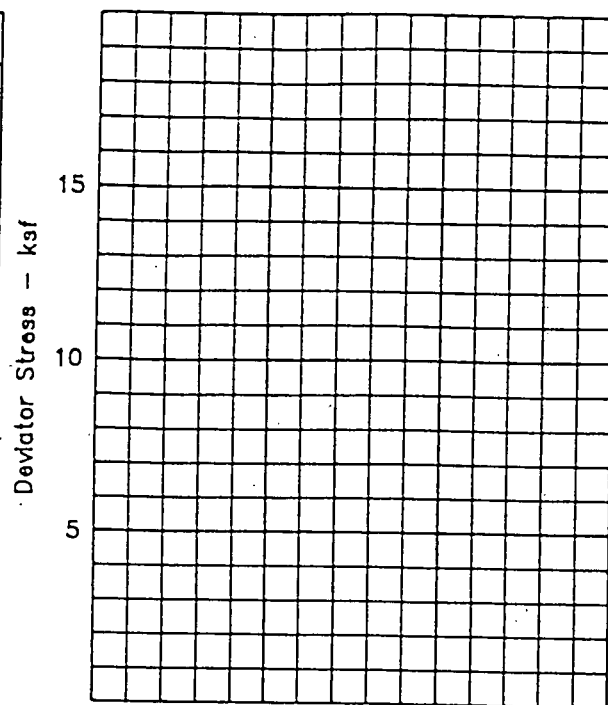
Consulting Soil and Foundation Engineers

TEST NUMBER	1	2	3	4
LOCATION	HOLE 52394 ● DEPTH 26.5-28 ft. SAMPLE BH00208JE			
HEIGHT - INCH	4.99	5.35	5.00	
DIAMETER - INCH	2.425	2.42	2.425	
WATER CONTENT - %	17.3	17.7	19.0	
DRY DENSITY - pcf	105	109	106	
$\sigma_1 - \sigma_3$	8.12	12.10	13.62	
$\sigma_1$ - ksf	9.39	14.62	17.41	
$\sigma_3$ - ksf	1.27	2.52	3.79	

TYPE OF SPECIMEN UNDISTURBED

SOIL DESCRIPTION CLAYSTONE

TYPE OF TEST UNCONSOLIDATED, UNDRAINED,  
TRIAXIAL SHEAR

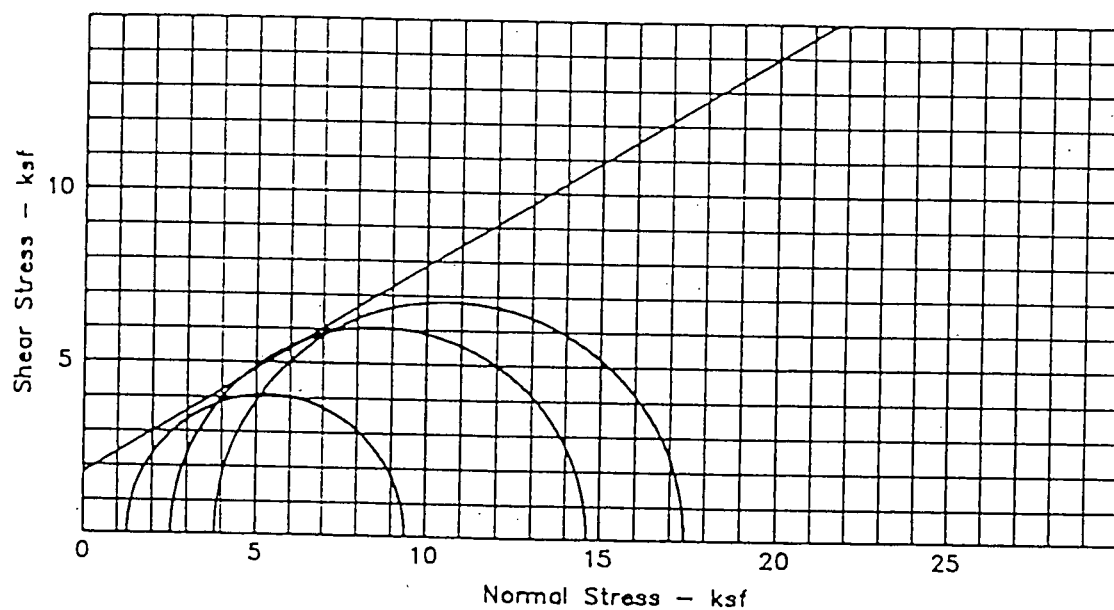


0 2 4 6 8 10 20  
Axial Strain (%)

TAN  $\phi$  0.608

$\phi$  31.3°

COHESION - ksf 1.75



1 527 94

**Huntingdon**

TRIAXIAL SHEAR TEST RESULTS

Fig. 12

# HUNTINGDON ENGINEERING & ENVIRONMENTAL, INC.

TABLE I  
SUMMARY OF LABORATORY TEST RESULTS

JOB NO. 1 527 94

SAMPLE LOCATION		GRADATION		PERCENT PASSING NO. 200 SIEVE	ATTERBERG LIMITS		SWELL/ CONSOLIDATION (%)	EXPANSION INDEX	SOIL OR BEDROCK TYPE
HOLE	DEPTH (feet)	GRAVEL (%)	SAND (%)		LIQUID LIMIT (%)	PLASTICITY INDEX (%)			
52194	0.5-2.5	30	35	35	37	18			Clayey sand with gravel (SC)
	4.5-6.5	1	14	85	49	29			Lean claystone with sand (CL)
	7.5-10.5	0	1	99	59	34			Fat claystone (CH)
52294	4-8.5	13	26	61	51	28			Sandy fat claystone (CH)
	8.5-11.5	0	7	93	43	25			Lean claystone (CL)
52394	1.5-3.5	18	36	46	69	37			Very clayey sand with gravel (SC)
	3.5-5.5	17	37	46	35	17			Very clayey sand with gravel (SC)
	7-9	0	0	100	66	41			Fat claystone (CH)
	10.5-12.5	0	1	99	60	35			Fat claystone (CH)
	15.5-17	0	8	92	36	18			Slightly sandy lean claystone (CL)
	24-26	0	0	100	53	30			Fat claystone (CH)
	28.5-29.5						2.3		
	29.5-30							21	

TABLE II  
PERMEABILITY TEST RESULTS  
JACOBS ENGINEERING, ROCKY FLATS SEWER LINE  
JOB NO. I 527 94

August 18, 1994

Hole No.	Depth (ft)	Sample No.	Initial Moisture Content (%)	Initial Dry Density (pcf)	Initial Void Ratio	B-Parameter After Saturation	Final Moisture Content (%)	Final Dry Density (pcf)	Least Hydraulic Gradient	Greatest Hydraulic Gradient	Coefficient of Permeability (cm/sec)
52194	6.5-7.5	BH00 214JE	23.0	100	.724	98	28.9	96	9.1	10.1	$4.7 \times 10^{-8}$
52294	6-7	BH00 203JE	26.6	95	.810	95	31.6	92	9.1	10.3	$8.8 \times 10^{-8}$
52394	7-8	BH00 209JE	26.1	96	.778	97	27.8	97	1.6	2.5	$2.3 \times 10^{-8}$

**APPENDIX A**  
**BORING LOGS RECORDED BY JACOBS ENGINEERING GROUP**  
**DURING EXPLORATORY DRILLING OPERATIONS**

## WELL-SITE FIELD LOG

Location Code: 52194

Date: 7/1/94

PAGE 1 OF 2

Rig Geologist: Terry Miyoshi

Project Sub-contractor: Jacobs

Drilling &amp; Sampling Equipment: Hollow stem split spoon

Cuttings:

Core: ☒

Core diameter (IN): 1 1/2 - 2

DEPTH IN FEET	RUN NUMBER	DRL TIME START/STOP	RECOVERY FT	SAMPLE NUMBER	DRUM NUMBER	CONTEXT NUMBER	LITHOLOGIC DESCRIPTION	COMMENTS
1	1	1025-1028	1.0	BH00212JE 1090 Classification			brn-clayey sand - Fill, dry	12
							brn-black clayey sand - fill, dry	25 class
		1037-1070					no recovery 212	50
2	2		1.0	BH00212JE 1040 Sieve			brn-black clayey sand, dry 1090	4 Sieve
				BH00212JE 1040 Afterdry			brn black clayey sand, dry	5 After
3		1040					no recovery	4
4	3		0.0				no recovery	3
		1045				1/1	no recovery - calcite on bit	5
5	4		1.3	BH00213JE 1105 Classification	1094JE 0-13.2		grn-white calcite, dry	5 class
				BH00213JE 1105 Sieve			grn-white calcite, moist 213	5 Sieve
6		1055					str white calcite moist 1105	7
							no recovery 5.8-6.0	
7	5		1.0	BH00213JE 1105 Afterdry			!!	6 After
		1105		BH00214JE 1110 Afterdry	Hydraulic Cond.		214 1110	10 Moist
8	6		1.0	BH00215JE 1130 Classification			dark gray claystone, moist	3 gradate 7.5'
		1110					dark gray claystone, moist	4 class
							no recovery	10
9	7		1.0	BH00215JE 1130 Sieve			grn-gray claystone, moist 215 1130	4
		1120					gray-gray claystone, moist	7 Sieve
							no recovery	13

Field Technician:

Print Name

Date:

Rig Geologist:

Print Name

Signature

Date:

Checked By:

Print Name

Signature

Date:

## WELL-SITE FIELD LOG

PAGE 2 OF 2

Location Code: 52194

Date: 7/1/94

Rig Geologist: Terry Miyoshi

Project Sub-contractor: Jacobs

Drilling &amp; Sampling Equipment: Hollow Stem / split spoon

Cuttings:

Core: 1 Core diameter (IN): 1 3/8 - 2

DEPTH IN FEET	RUN NUMBER	DRIILL TIME START/STOP	RECOVERY FT	SAMPLE NUMBER	DRUM NUMBER	CONEX NUMBER	LITHOLOGIC DESCRIPTION	COMMENTS
11	8	1130	0.7	811002153E 1130 Atterberg			grn-gray claystone, moist no recovery 10.7-11.0 no recovery	6 Atterberg 12 14
12	9	1145	0.6				grn-gray claystone, moist no recovery 12.1-12.5 no recovery	6 14 14
13							no recovery 17.0-17.2'	TD 13.2'

Field Technician:

Print Name

Signature

Date:

Rig Geologist:

Print Name

Signature

Date:

Checked By:

Print Name

Signature

Date:

## WELL-SITE FIELD LOG

Location Code: 52224

Date: 6/30/94

PAGE 1 OF 2

Rig Geologist: Kerry Miyoshi

Project Sub-contractor: Jacobs

Drilling &amp; Sampling Equipment: Hollow Stem / Split Spoon

Cuttings: Core: Core diameter (IN): 1/8" - 2

DEPTH IN FEET	RUN NUMBER	DRILL TIME START/STOP	RECOVERY FT	SAMPLE NUMBER	DRUM NUMBER	CONBOX NUMBER	LITHOLOGIC DESCRIPTION	COMMENTS
		1530					Subgrade - reddish sand, dry	Blow
			NA				0.0 - 0.6	comb
1		1540					0.6 - 1.0 - sandy clay, dry	Heck Augered 0.0 - 1.0
2	1		0.2				1.0 - 1.2' clayey gravel - dry, dry hard, no recovery to 1.5'	8
							no recovery	7
		1545					no recovery	7e
3	2	1550	0.3				2.5 - 2.8' sandy gravel, dry	1
							no recovery to 3.0'	1
							no recovery	2
4	3		0.5	BH00210JE 1620 Classification	4695JE 0-13	1/1	grn - clayey calc, moist	2 class
5		1555					no recovery	1
							BH00210JE 1620	2
6	4						white - gen calc, moist	5
			1.0	BH00210JE 1620 Sieve			white - gen calc, moist	7 sieve
7		1610					no recovery	12
	5		0.9	BH00209JE 1615 Atterberg BH00210JE	Hydrous Content		white calc, moist	7 Moisture
8		1615					rec ~ .4' white calc, moist	9 Atterberg
				BH00210JE 1620 Atterberg			white - gen calc, moist	3d
9	6		1.0	BH00210JE 1640 Classification			grn - white claystone, moist	6 class
							no recovery	7
		1620		BH00210JE 1640 Sieve			grn - white claystone, moist	5 sieve

Field Technician:

Print Name

Date:

Rig Geologist:

Kerry Miyoshi

Signature

Date:

6/30/94

Checked By:

Print Name

Signature

Date:

7/5/94

Print Name

Signature

## WELL-SITE FIELD LOG

PAGE 2 OF 2

Location Code: 52294

Date: 6/30/94

Rig Geologist: Kerry Miyoshi

Project Sub-contractor: Jacobs

Drilling &amp; Sampling Equipment: Hollow Stem / Split Spool

Cuttings: Core: ☒ Core diameter (IN): 1 7/8 - 2

DEPTH IN FEET	RUN NUMBER	DRL TIME START/STOP	RECOVERY FT	SAMPLE NUMBER	DRUM NUMBER	CONTEXT NUMBER	LITHOLOGIC DESCRIPTION	COMMENTS
			0.5				no recovery	BH 002112E 1640
11	7	1627					no recovery	
				BH 002112E 1640 Afterburg			gn-gr grey clay shale, moist	
12	8		0.8				rec. 3'	
							gn-gr grey clay shale, moist	
		1640					no recovery	
13		1645	0.0				no recovery	
								TD 13.0'

Field Technician:

Date:

Rig Geologist:

Print Name

Signature

Date:

Checked By:

Print Name

Signature

Date:

Print Name

Signature



## WELL-SITE FIELD LOG

PAGE 1 OF 3

Location Code: 5294

Date: 6/29/94

Rig Geologist: Terry Miyoshi

Project Sub-contractor: Jacobs

Drilling &amp; Sampling Equipment: Halliwell/split spn

Cuttings: Core: Core diameter (IN): 1 7/8 - 2.0

DEPTH IN FEET	RUN NUMBER	DRL TIME START/STOP	RECOVERY FT	SAMPLE NUMBER	DRUM NUMBER	CONTEXT NUMBER	LITHOLOGIC DESCRIPTION	COMMENTS Blow counts
	1	1000		NA			surface soil - not Alluvium - fill, dry	-
			1.0				Alluvium - sandy gravel w/ stick pebbles sand, dry	25
1		1015					No recovery - rock in shoe	15
2				BH00201JE 1040 Classification			Red clayey gravel, dry	5 Pen
	2		1.0	BH00201JE 1040 Sieve			Red clayey gravel, dry	7 Sieve
3		1030			4530JE 0-8		no recovery	8
				BH00201JE 1040 Alluvium			Red clayey gravel, dry	Attenuation
4	3		1.0	BH00202JE 1050 Classification			lt brn clayey calcite, dry	11 sieve
		1040					no recovery	14
5				BH00202JE 1050 Sieve			lt brn clayey calcite, dry	8 Sieve
	4		1.0	BH00202JE 1050 Alluvium			lt brn clayey calcite, dry	10 Alluvium
6		1050					no recovery	9
				BH00203JE 1110 Moisture			gr - gray clayey calcite, dry	
	5	1100	1.0	BH00203JE 1110 Sieve			BH00203JE for Mem 4.5-7.0	
7				BH00204JE 1120 Classification			brn gray clayey calcite, dry	3 sieve
			1.0	BH00204JE 1130 Sieve			grn gray claystone, dry	5 sieve
8	6	1120					no recovery	8
				BH00204JE 1130 Alluvium			grn - gray claystone, dry	5 sieve
9			1.0				gray claystone, dry	9
	7	1130					no recovery	10

Field Technician:

Date:

Rig Geologist:

Print Name

Signature

Date:

Checked By:

Print Name

Signature

Date:

## WELL-SITE FIELD LOG

PAGE 2 OF 3Location Code: 52394Date: 6/29/94Rig Geologist: Larry MiyahProject Sub-contractor: JacksDrilling & Sampling Equipment: Hollow Stem / Split SpoolCuttings:        Core: ✓ Core diameter (IN): 1 3/8 - 2

DEPTH IN FEET	RUN NUMBER	DRILL TIME START/STOP	RECOVERY FT	SAMPLE NUMBER	DRUM NUMBER	CONBOX NUMBER	LITHOLOGIC DESCRIPTION	COMMENTS Blow Counts
11	8	1330	1.0	BH00205JE 1410 Classification			lrm clayey - calcide?, dry	
		1350			205		lrm clayey calcide - dk gr grn detrital dry	8 S. Pen
							no recovery	9
12	9		1.0	BH00205JE 1410 Sieve	140		dk gr grn claystone, dry	sieve
				BH00205JE 1410 Attrition			dk gr grn claystone, dry	> Attrition
13		1410					no recovery	10
					4531JE 8-14		7" grn claystone, dry	
14	10		1.5				gray grn claystone, dry	12
		1430					gray grn claystone, dry	15
15							gray claystone, dry	
	11		1.5				dry	22
16		1500		BH00206JE 1520 Classification			sandy claystone, dry	34 S. Pen
				BH00206JE 1520 Sieve			sandy claystone, dry 20% 1520	sieve
17	12		1.0	BH00206JE 1520 Attrition			sandy claystone, dry	20 Attrition
		1520					no recovery	25
18	13		1.5				dk gray claystone, dry	8
							dk gray claystone, dry	14
19		1540					dk gray claystone, dry	22
	14		1.5				dk gray claystone, dry	23
							dk gray claystone, dry	

Field Technician: \_\_\_\_\_

Date: \_\_\_\_\_

Rig Geologist: Larry Miyah

Signature: \_\_\_\_\_

Date: 6/29/94Checked By: [Signature]

Signature: \_\_\_\_\_

Date: 7/5/94

Print Name

Signature

## WELL-SITE FIELD LOG

PAGE 3 OF 3

Location Code: 52394

Date: 6/29/94

Rig Geologist: Jerry Miyoshi

Project Sub-contractor: Jachs

Drilling &amp; Sampling Equipment: Hollow Stem / Split Spoon

Cuttings: Core: ☒ Core diameter (IN): 1 5/8 - 2

DEPTH IN FEET	RUN NUMBER	DRILL TIME START/STOP	RECOVERY FT	SAMPLE NUMBER	DRUM NUMBER	CONTEX NUMBER	LITHOLOGIC DESCRIPTION	COMMENTS
		1530			4532JE		gray claystone, dry	63
					14-24		gray claystone, dry	11
21	15		1.5				" dry	27
22		0815					" dry	50
							gray claystone, dry	19
23	16		0.5				no recovery	23
		0835					no recovery	50
24							hard gray claystone, dry	40
	17		1.5	BH00207JE			hard gray claystone, dry	24
				0905 Classification				
				BH00207JE			hard gray claystone, dry	50
25		0850		0905 Scale			hard gray claystone, dry	15
	18		1.0	BH00207JE			hard gray claystone, dry	38
		0905		0905 After				
26					4533JE		" dry	20
				BH00208JE	0-30			
27	19		2.0	0950				45 0-2850 (1)
				Triaxial				30 0-2850 (1)
				-3, 0'slow				110 0-2850 (1)
28		0920					Measured: 29.5'	30 0-2850 (1)
29	20		2.0	BH00208JE			" dry	24
				0950 Shear				57
				2 - 6" slow				Shear
		0946		BH00208JE				385"
				0950 Expansion				Exp 1.000

Field Technician:

Date:

Rig Geologist:

Print Name

Signature

Date: 6/30/94

Checked By:

Print Name

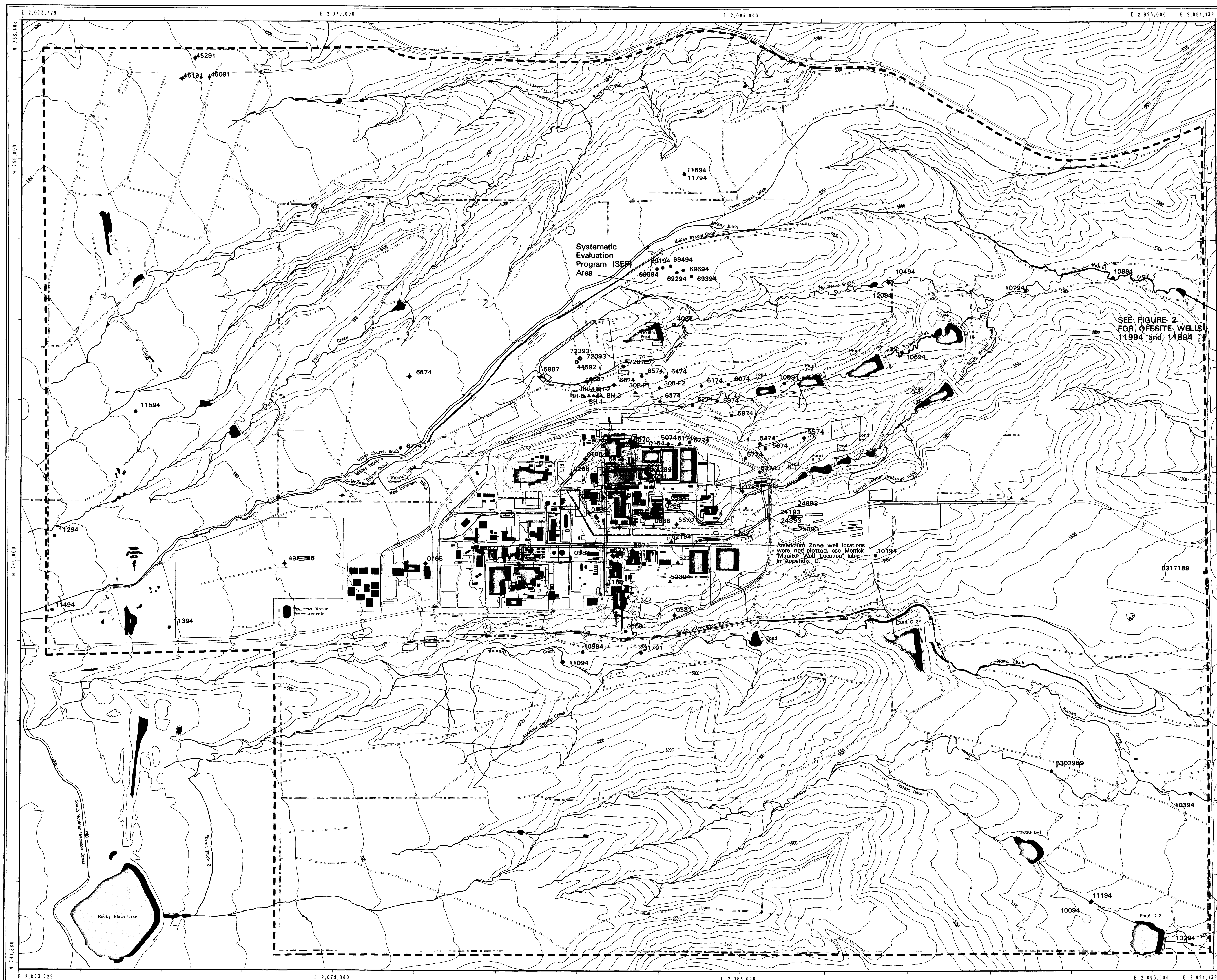
Signature

Date: 7/5/94

Print Name

Signature





**FIGURE 1**  
**Rocky Flats Environmental Technology Site**  
**WARP Location Map**  
**FY94**

**EXPLANATION**

- Abandoned Well
- Abandoned Boreholes
- Geophysical Survey Well
- New or Replacement Well
- SEP Boreholes
- Geotechnical Boreholes
- Geoprotectors (BH) and Piezometers
- Repaired Well/Piezometer
- Individual Hazardous Substance Sites
- Building or other structures
- Lakes and ponds
- Streams, ditches, or other drainage features
- Fences
- Contour (20' Intervals)
- Rocky Flats boundary
- Paved roads
- Dirt roads

**DATA SOURCES:**

- Buildings: Provided by Engr., Rocky Flats, Inc. - 1991.
- Facilities: Provided by EG&G, Rocky Flats, Inc. - 1991.
- Hydrology: Provided by USGS (date unknown).
- USGS: Hazardous Substance Sites (IHSS's) defined by the following:
  - OU1 - RF/RI Phase III Report
  - OU2 - 7, 11, & 15 - HRR
- The remaining OU's are defined by their respective Operation Unit Workplan.
- Buildings, roads, and fences provided by EG&G Engineering, Rocky Flats, Inc. - 1991.
- Hydrology: Provided by USGS (date unknown).

State Plane Coordinate Projection  
Colorado Central Zone  
Datum: NAD27

U.S. Department of Energy  
Rocky Flats Environmental Technology Site

Prepared by:  
**EG&G ROCKY FLATS**

Rocky Flats Environmental Technology Site  
P.O. Box 464  
Golden, Colorado 80402-0464

SW-4-002179  
1 of 1

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